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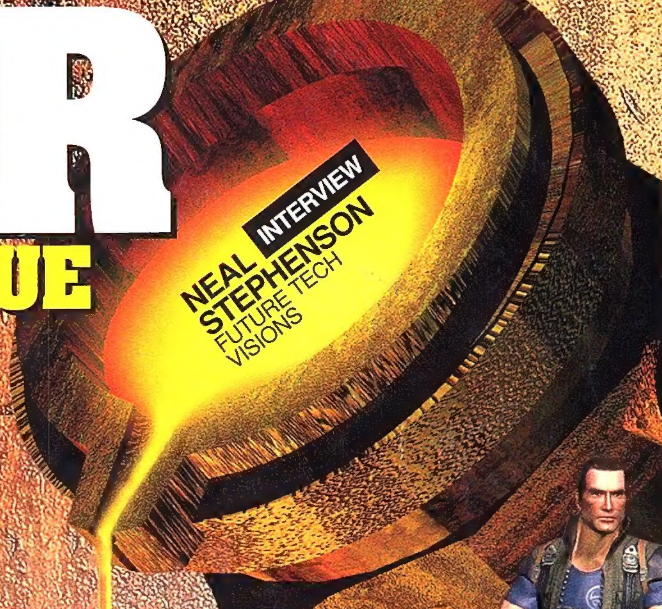

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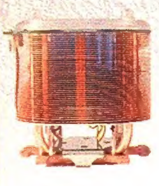

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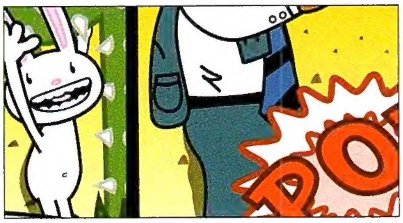

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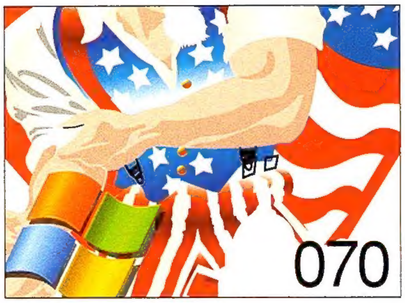

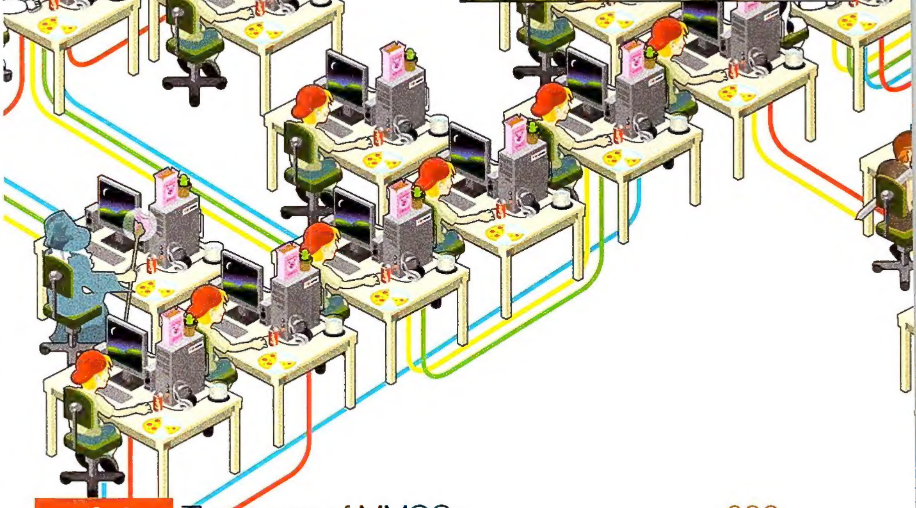

feature The power of MMOGs 036

What power, what flexibility! And no, we're not talking about your level 30 warrior-courtier from Neverland Online. No, we're talking about the machines and software that support all those massively multiplayer online games! Ashton Mills ventures into the Badlands for more.

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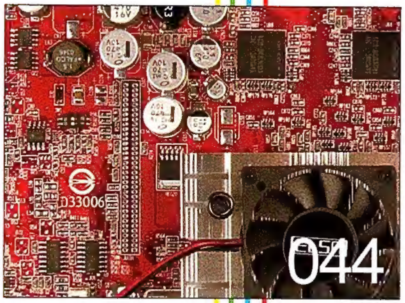

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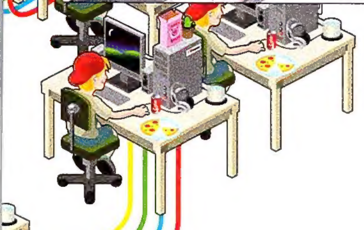

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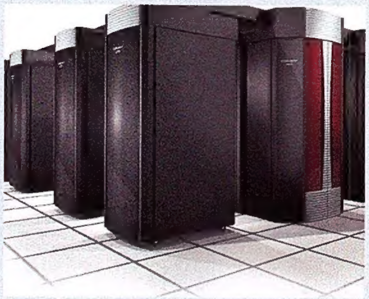
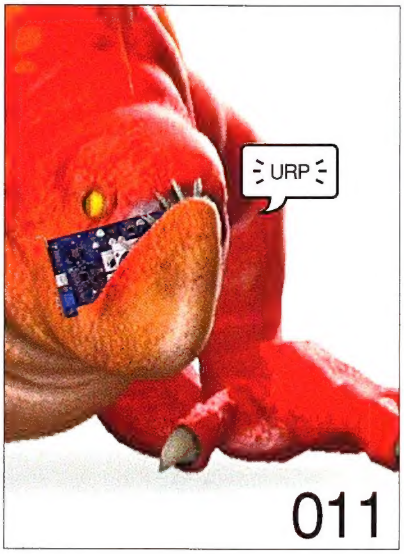


head to head Supercomputers 030

Toby sat down gingerly at his deck, took out his 'leads and jacked in. Series 2000 or not, the giddy, greasy cyberhack was confident he could patch the ICE and penetrate the firewall; his trusty tools being raw, self-developed skills of unequalled prowess, and a hastily-made sausage sandwich with brown lettece and craft glue. He had balls, young Toby did, but how many was he willing to part with in order to fund his unhackable hack? Pfft. All he needed, of course, was a supercomputer! James Wang surveys the massive market of master systems.



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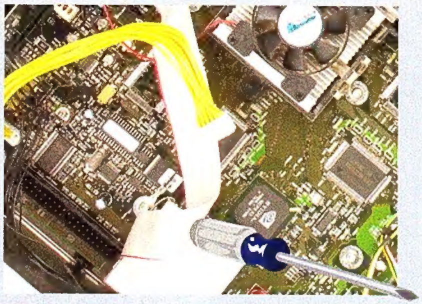
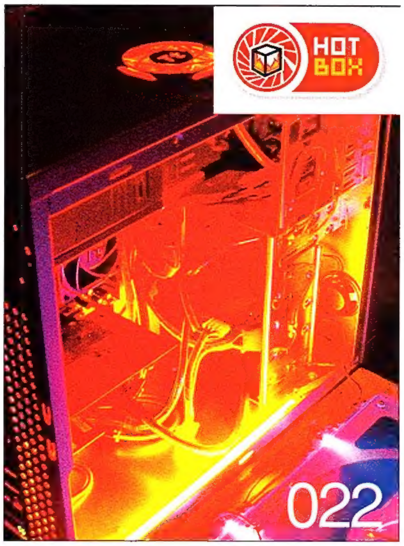


x-ray Moddin' it 026

Will contemplated his black, plastic box. Well, right now it was more a plastic box in heaps of little pieces, but a box nonetheless, at least at one point in its existence.

Unburdened with the skills of a professional electrical engineer, Will had bravely wielded a screwdriver and disassembled his sparkling new console, to impregnate it with a mod chip like a rogue baby facehugger. Yes, eight-year old Will could do anything. Except this. Crying long into the night, Will cradled the chunks of his scattered console like parts of his soul. Sound like you? Even if it doesn't, join Phil Chia as he solves the mystery of the mod chip. Find out how they work so you're not left all teary.

HOT BOX



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072

edhead

Powerage

Every issue of Atomic is the 'Power Issue'. It's just what we are. Y'know – Maximum Power Computing. But, this one feels more powery than usual, so we're giving it a name. Not just a name – a *killing word*. Power.

James Wang, who is a walking genius, even when he's sitting still, pulled together a magnificent feature on supercomputers this month. I'm really happy with how he's handled the topic. James did a ton of legwork, interviewing key players in the supercomputer scene. We really wanted to do something special on the topic, as supercomputing is truly Maximum Power Computing. Kind thanks to everyone who helped James with this.

We've also tackled MMOGs this month. Ashton went behind the wizard's curtain for this one. You won't be reading a regulation, write-by-numbers feature on this topic. There are plenty of other sources for boring MMOG write-ups. Atomic's job is to give you the meat between the white fluffy loaf, and when we got Ashton's feature, we knew for sure that issue 40 truly is a 'power issue'. No matter how heavily you're into MMO gaming, there's stuff in here I guarantee will be news to you, exciting stuff too. We wanted to get behind the gaming, and into the engine room. It's truly a fascinating read, and I reckon Ash is going to win an award for this one.

John's had a good month. We gave him a couple of weeks holiday, because he hasn't really had one since Atomic launched, and on the day he got back he interviewed his literary idol, Neal Stephenson. As it turned out, Neal gave us some Atomic-style insight into how he sees the future of computing, and technology for the consumer. He's 100 percent visionary and sees things with Nostradamus-like clarity.

Down the back end, we're pushing more towards giving you quality gaming tech. We'll still do reviews, but we know that the world is full of game reviews, and giving you more isn't our function. We also know that when we do game reviews, they kinda rock, so we're doing the big ones. Far Cry, UT2004 and Battlefield: Vietnam are as big as big gets. Personally, I'm absolutely blown away by Far Cry. I don't usually play single-player games through to the end, but I'm now halfway through my *third* go at Far Cry – bumping up the difficulty each time. Man it's good. Even on gumby-level difficulty it's a killer. And the design is just out of this world. Best Game Ever. Of the month.

The Power Month. And it's only going to get better. 2004 is starting to heat up. It's already damn hot. Thanks for coming.

Ben Mansill
Editor

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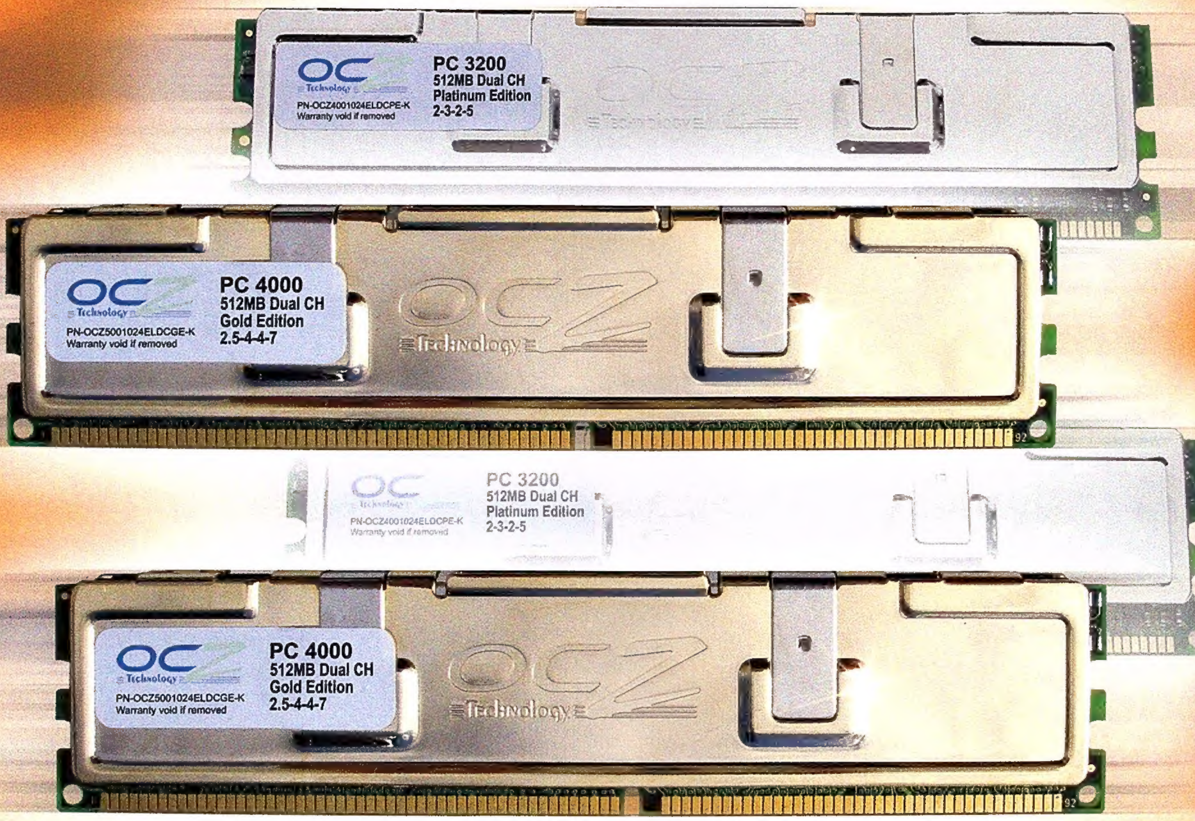

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Atomic Webkit

Two top *Atomic* web design tutorials, and the tools to do them!

Web presence is a must these days. Have to be live to survive. . . or something to that end. At *Atomic*, we're more than happy-excited to provide a helping hand, so we've packed together the best web development apps, along with two content-packed tutorials! Check it.

Boot Sector

This is the section that has it all – drivers and upgrades. We have the latest for the foremost hardware vendors. Have an NVIDIA or ATI card? How about a Creative sound card or VIA chipset? Need DirectX 9.0? Then come park your class 1 laser here.

Compression tools

Whether you're unpacking files or compressing your less-than-family orientated image archives, you'll need the best compression tools. Every month, we provide the top four archiving utilities so you'll never need to go far for your needs.

Miscellaneous (reader request)

This section caters to reader requests, as well as provides the latest versions of software. Currently, we have Mozilla's Firefox 0.8, Opera 7 and Acrobat Reader, but we'd love more reader stuff. Send your requests to cd@atomicmpc.com.au.

THE NEW STUFF

Atomic resources

To help you in your crusade to craft the best Flash animation ever, we've stuck a bunch of *Atomic* assets on the CD. There's the standard logos, covers and wallpapers. Please check the terms and conditions below regarding use.

Magazine

Check this area out for mag-to-CD content. At the moment, it's populated by the Benchmarks page. Fresh from a web makeover it sports hyperlinks to vendors, and in the future, config files to help you benchmarks your systems.

Design tutorials

Here's the meat, right here. Two heavy-weight web design tutorials so you can carve out your own home in cyberspace. Sean Tearney, our resident Flash expert, shows you how Flash animation is done, while Logan Booker hacks away at hand-crafting web pages.

Web design software

This section will provide you with several types of software you'll need to get your page online. Filezilla, one of the best, free FTP clients available is in this section so you can upload you work; Paint Shop Pro 8 for graphics, and Swishmax to help those Flash animations.

FLASH MX 2004
Atomic Webkit
40
Design, create and animate your own home on the web! Tools, tips and tutorials let you BUILD THE GREATEST SITE ON THE WEB!
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CDGuide

Studio MX software

Can't make a Flash animation without Flash MX! Along with this superific program, we've whacked on Dreamweaver for web page design, and Fireworks to help spruce up your animation images. Have a look, and discover how easy web design can be. We recommend you read and follow through the *Atomic* tutorials also on this month's CD to get the most out of these apps.

WHY YOU WANT ME

- Professional tools to design appealing Flash animations, dynamic web pages and imagery.
- Two extensive tutorials on Flash development and web page creation – learn all the tricks to web design.
- Latest versions of Macromedia Dreamweaver, Flash and Fireworks MX, as well as Swishmax – a web development tool made here in Australia.
- Collection of Atomic graphics that you can incorporate in your web pages and Flash animations, or just use as wallpapers!

tutorial

Use your Flashtastic abilities and win a copy of Studio MX 2004 or Flash MX 2004, thanks to Macromedia and *Atomic*!

Put those creative skills to use and have a chance to win one of these great products from Macromedia. All you have to do is design a killer Flash animation using the tools provided on this month's CD. We've compiled a bunch of the best programs to help you paint your masterpiece. Entries will fall into one of the following categories:

Studio MX competition

Something new and shiny is making its way to next month's CD, and we need a wicked Flash animation to spice it up. There's no call for functionality – we're simply after the most creative, good-looking Flash animation you can come up with.

It needs to be slick and professional and fit the dimensions 736 pixels by 180 pixels. A space should be provided to enter a title (such as 'Atomic CD'), and it needs to feature *Atomic* elements – especially the magazine logo in some form.

macromedia FLASH MX 2004

Flash MX competition

It's a creative free-for-all kids! Whatever you can come up with, goes. Be it functional, decorative or funny, it'll be in the running. Just make sure it isn't too big, or too aspirational – be realistic. Make it tight and make it good. Use of the provided *Atomic* resources is optional, but it never hurts

While ActionScripting isn't essential, if you need it to make the animation do its thing, go right ahead. Winners will be chosen by a panel of illustrious *Atomic* judges, and the lucky individuals' Flash animations will appear on the cover CD of issue 43.

To make things simple – no sounds or music are allowed. Miming and silent interpretive dance only. Send your entries to cd@atomicmpc.com.au with 'Studio MX competition' in the subject field. Include your name, a small description of the animation and the finished SWF, along with the FLA in the email.

Both competitions close on 19/05/2004. So get cracking.

Terms and conditions: One entry per person per competition. The winner of the Studio MX competition will not be eligible for the Flash MX competition and vice versa. All entries must be new, original creations, not existing works. Imagery contained on the CD is provided for personal use only, and use in conjunction with the above competitions. Use of imagery for any other purpose, commercial or otherwise, is prohibited.

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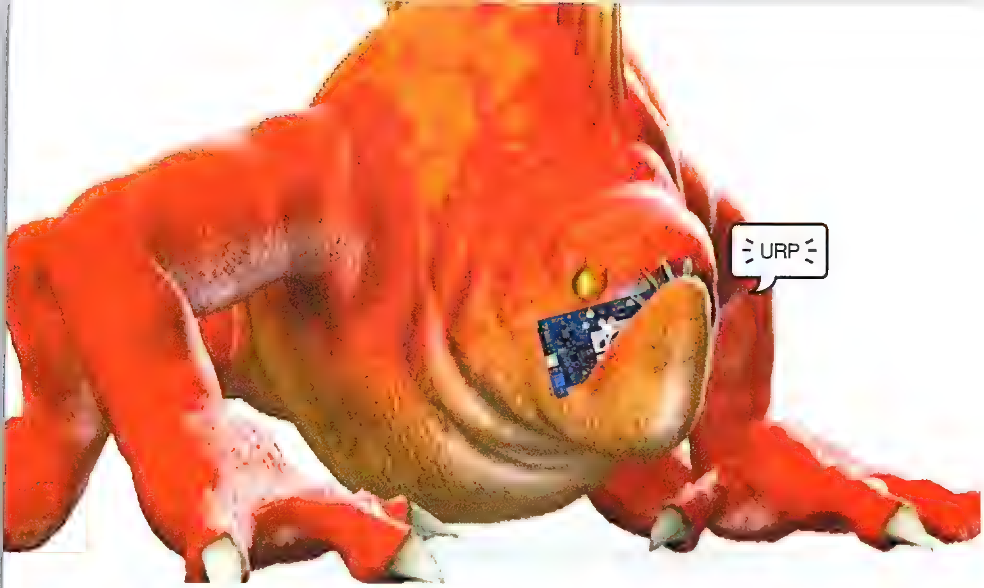


Software vs. Hardware: The new battleground

While hidden in a steaming mountain of rhetoric and the glitz of ATI R420 powered demos, the gloves are already off in the next gen console wars.

We don't think anybody was that surprised when Microsoft didn't announce the next generation of Xbox at this year's Game Developers Conference. The next generation is still a while off yet, and it has almost become a waiting game to see whether Sony, Microsoft or Nintendo will take the plunge and announce something. Because the one certainty is that once one of these companies declare the next generation competition open we will be flooded with information.

What Microsoft did announce was probably the opening salvo of the next gen console wars, a new software development environment called XNA, which is a kind of pseudo-acronym for DirectX/Xbox Next Generation Architecture (XNA is much cooler than DXNGA).

Like Microsoft's .NET initiative this is somewhat of a nefarious combination of software development tools, a dash of middleware and a grand corporate philosophy. The theory behind XNA is that it will simplify the game development process by reducing the amount of time game developers need to take to code the back end of the game, giving them more time to work on the game concepts and content.

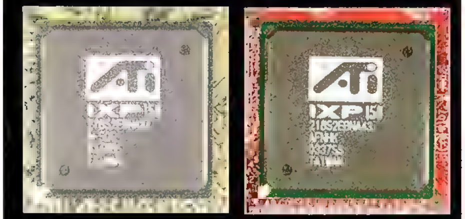
It should allow different tools to plug together more easily, and while the platforms covered belong to Microsoft, the middleware tools that snap into the XNA environment will come from all quarters, with companies like Havok, discreet, Alias, NVIDIA, ATI, Crytek, Softimage, Epic and Valve all throwing weight behind the XNA announcement.

Hidden within the announcement was the news that one of the spin-offs of this is that XNA has the potential to bring Xbox Live to the PC, enabling PC and Xbox gamers to play together on future titles. Also hidden was the fact that the fandangled XNA graphics demos were running on ATI's next generation graphics card, codenamed R420.

The actual announcement was fairly high level and conceptual, but the relevance of this to the next generation of Xbox is made clear in the FAQ on Microsoft's XNA homepage (www.microsoft.com/xna/faq.aspx). It comes in the form of the question 'What's the difference between Microsoft's XNA and Sony's Cell?' The answer to which ends with a delectable dose of irony '...Sony is talking about a fixed world of hardware that requires everyone to buy everything Sony. Sony's Cell is a hardware solution. This is a software revolution.'

Let the battle commence.

Reading the fine print



Early boards sporting the ATI RADEON 9100 IGP chipset used version A43 of the IXP150 Southbridge which had some curious USB bugs.

Thankfully a new A44 revision of the IXP150, which fixes the problems, has started appearing on retail products. To help ensure you only get the freshest silicon keep an eye on the first line of information printed on the IXP150.

If it ends with A44 you are in business.

ShortCircuits

Actung! In a move towards sensibly using the available pages we have, and making use of the comparatively abundant space on the cover CD – we've moved our Benchmarks page there. As time passes, we may add other benchmarky stuff there too. We'll update you here if we change Benchmarking tests.

Melbourne LANners have a unique new venue to take their fun. BFG LAN (www.bfglan.com.au) runs four eight-hour sessions each weekend, which is nice, but the cool bit is that they have keyboards and monitors ready for you, so all you need to haul is your case. Sweet. Atomican's are adminning it too, making it pretty damn lush.

Currently under research, Thornn Micro Technologies have harnessed the power of miniature lightning bolts to create a better chip cooler. This technique uses carbon nanotubes of only 5nm in width. With an applied electrical charge, the air around them is ionised, producing a breeze of up to 32km/h from the collisions between the ions and neutral molecules. Say your prayers, pathetic fans.

The makers of the highly popular Opera browser have announced they are to release a spunky new browser intended for small devices such as mobile phones. This new browser will include IBM's embedded speech recognition technology, dubbed 'ViaVoice', giving users the ability to browse the internet and request/complete data simply with their voice, or maybe even other body noises. We hope it's context sensitive – whose four a pear of blew shoos?

AUSEGAMER

ABOVE: The BadGirlsClan – girls just having fun.

The e-sports community recently applauded a decision made by the Cyberathlete Professional League not to hold a female Counter-Strike league. CPL frontman Angel Munoz decided against the move citing the equal worth of male and female competitors. It's no secret that e-sports, and gaming in general, has been moving slowly toward the female market.

Five years ago, female gamers were a rarity; a party trick. One of the 'cool nerds' dragged them along to a LAN and proclaimed 'Hey! My girlfriend plays games!'. She, meanwhile, would sit silently in the corner behind a dusty 15 inch monitor playing her twentieth game of Hearts.

Come forward a few years, and the LAN-female is not such a rare sight. Literally hundreds of all-female clans exist across the whole board of games from Warcraft to Quake III. It seems like game companies have finally cracked the hardest nut of all.

So why, more than ever, are we finding blatant sexism in games? Surely an increased female audience could press developers into widening the waistlines and re-proportioning the bust-to-body ratio of female characters. The man himself, Paul Steed, creator of models for games such as Quake III says it's merely a case of demand and supply. To any discerning gamer this sounds a lot like we're being told sexism is the norm and we should just go with it. We've no doubt the almighty dollar is a strong force in the production of games, but is profit being placed ahead of the gaming community's dignity? Let's explain.

Age old stereotypes abound in the community concerning the quintessential 'geek'. A loner with no friends sitting at home all day playing games and searching for the latest Tomb Raider screenshots to drool over. Over the past two or three years we've seen a change in people's perception of LANers – with one key exception; busty women are still the focus of the quintessential geek's life. Has sexism become inherent to the LAN subculture?

There is no doubt that e-sports could offer the world the perfect competition. The online world is a haven of anonymity and equality. As the famous hacker 'The Mentor' put it when speaking on the subject of cyber-anonymity: 'We exist without skin colour, without nationality, without religious bias'. Sure, there are international rivalries between countries, but these are friendly rivalries that spur players to attain a level of perfection not seen in recent years. Yet this anonymity is generally not afforded to the female populace unless they are smurfing under a male name. Admitting you're female is asking for 20 private messages and various requests for cybersex.

Who says female gamers don't deserve the same level of respect as male gamers? Actually, many believe that women are more predisposed to multi-tasking. Theoretically, this means women would be better at map control, strat planning and micro-management. The top-gamers of tomorrow could all be female. It's a growing trend, too. Clans like BadGirlsClan, the largest all-female clan in the world, are popping up everywhere matching some of the toughest competition in the world. Pro-gamer mad Korea has huge numbers of female Starcraft players, some of whom, ToSSgirl for example, are celebrities in their own right. So it comes down to a simple idea of equality. Let's all get off our arses and stop calling fill-in players 'sluts' and using obtuse sexual innuendo whenever girls are mentioned in gaming media.

Stuart Denham

Hot

- www.bbc.co.uk/celebdaq/ – but Hilton still isn't hot
- Tropical islands
- Smart HSF design (Go go Gigabyte!)
- PC gaming the revolution has begun
- Neal Stephenson. Dream weaver

Not

- www.asx.com.au – no celebs, down on weekends
- Martian corridors
- Flash but useless water cooling
- Mobile gaming – the revolution has stalled
- Wachowski brothers. Destroyers of dreams

atomican

Since the dawn of computing, wily software programmers have placed undocumented features and amusing tidbits deep within their code, dubbing them 'Easter Eggs'. In fact, searching for these eggs has become a popular pastime, with an entire dedicated online community (www.eeggs.com).

Atomic has its share of Peter Cottontails, too… concocting handy tech tutorials and gadget guides, and spreading them liberally through the Forums. But you needn't search hard to find these treasures. Simply visit www.atomicmpc.com.au/forums.asp and check out the threads stickyed at the top of each forum:

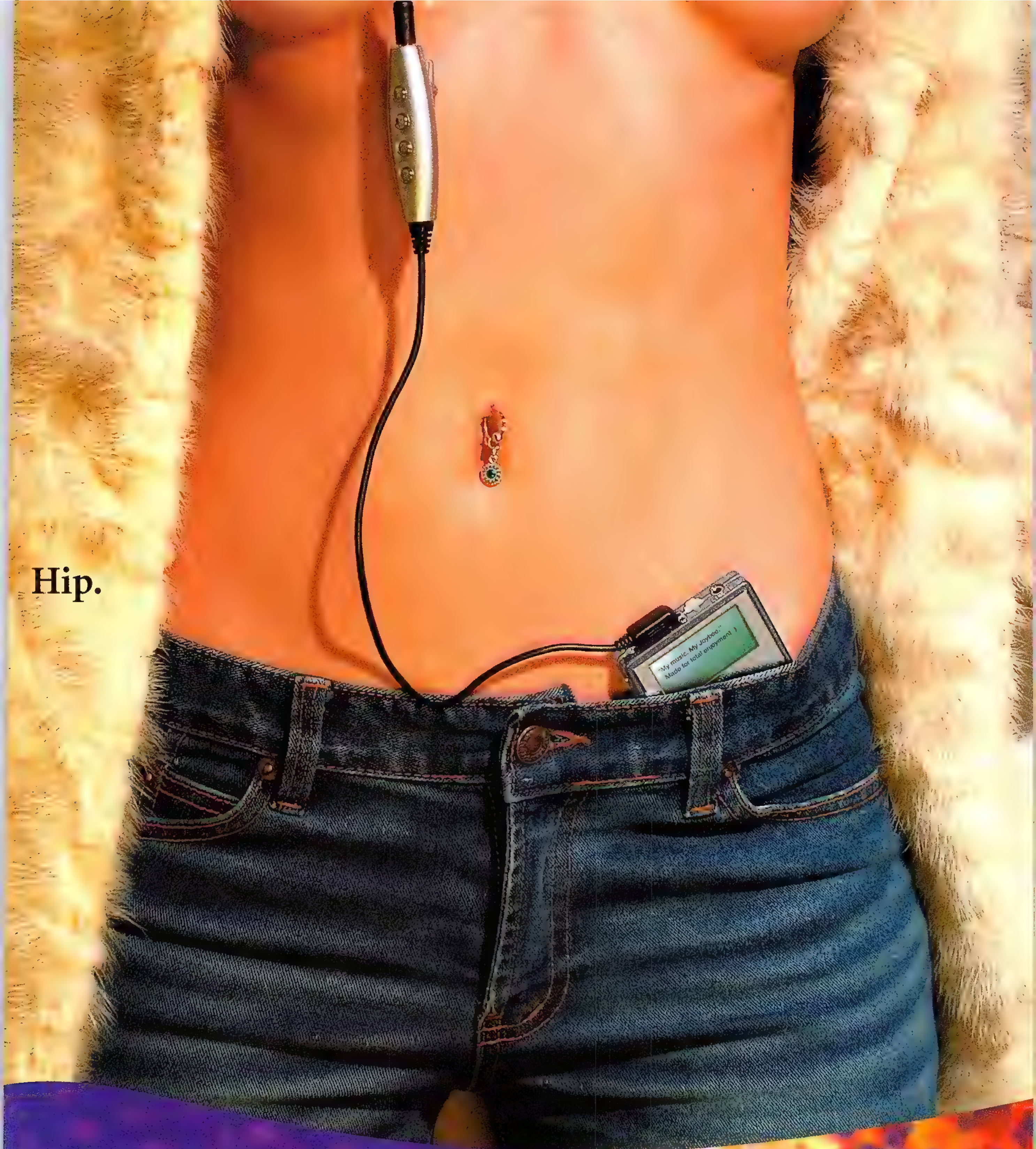
- *Beginner's guide to buying a graphics card*, Graphic and Sound Cards, Amiga4eva.
- *IDE / ATA guide for gumbies*, Tech Talk, Mac_Dude.
- *Video cards infolist*, Graphic and Sound Cards, Readerr0r.
- *CPU pricewatch*, Overclocking and Cooling, Spyx.
- *Memory pricewatch*, Building and Troubleshooting, MoRoSiS.
- *Motherboard pricewatch*, Building and Troubleshooting, 0Cyrus0.
- *Harddrive pricewatch*, Building and Troubleshooting, Mac Dude.
- *Video card pricewatch*, Graphic and Sound Card, Virul.
- *Optimisation of a new PC*, Building and Troubleshooting, Virt.
- *Tweaking your graphics card*, Graphic and Sound Cards, Amiga4eva.
- *Beginner's overclocking guide*, CPUs, Overclocking and Cooling, DonutKing.
- *Ultimate guide to CPU cooling and overclocking*, CPUs, Overclocking and Cooling, Spamzor.
- *Computer tech tips*, Tech Talk, vicdes.
- *Basic troubleshooting guide for n00bs*, Building and Troubleshooting, DevilsAngel21.
- *Atomic overclockers database*, CPUs, Overclocking and Cooling Forum, azns_kickass.
- *Using LEDs and other fundamental electronics*, Modding, Goth.
- *Cases and Casemodding*, Modding, KGB.
- *Photographing your case*, Modding, Squeeks.
- *Several Linux tutorials, Unix, Linux and Open Source*, by NutterPC, Greenhouse, mcbridematt, and Alcoholic.
- *Programming tutorial database*, Programming, Blitz[VFF].
- *Unix (Bourne) shell scripting*, Programming, stadl.
- *mIRC scripting*, Programming, Ne()phyte.
- *Links to Photoshop, Illustrator, 3D Studio Max, Dreamweaver and Flash Tutorials*, Multimedia, Digweed.
- *Introduction to networking*, Networking, Johnsee.
- *Networking technology, topology and components"*, Networking Forum, by Amiga4eva.
- *Introduction to wireless networks, standards and security*, Networking, Mr Mephisto.
- *Internet pricewatch*, Networking, The Prophet.
- *Atomic open source exchange*, Unix, Linux and Open Source, Trev99.
- *Console games exchange*, Console Games, Panties.

Virt

POTM 40

Atomic Photoshop Challenge
www.atomicmpc.com.au/atomicshop.asp

Nihilistic Automaton has been giving us a weekly laugh and fun new things to get into. His Photoshop Challenges have let Atomican's express themselves in crazy new ways. This stuff is brilliant, disturbing and hilarious. You can see most of it in Atomic Photonic. Nice work.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ybee 150 Noble Silver, Passionate Orange & BenQ Purple

Joybee 120 Cool Silver, Passionate Orange & Radiant Green

oybee

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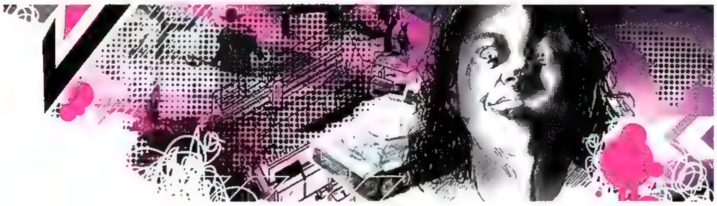

In search of stupidity

Daniel Rutter reflects on those little moments when human intelligence fails spectacularly.

Why are people so stupid?

By 'people', I don't mean the great mass of folk who, unlike us, lack perfect knowledge of all important things. Like what CAS latency is, and how low to aim for the maximum chance of a sustained-fire headshot from the Counter-Strike MP5.

No, I mean all of us. Me, you, him over there, your Member of Parliament, Stephen Hawking and Gore Vidal. We all do cretinous things, at least some of the time.

The issue of intelligence, human, frequent lack of, is one of considerable interest to us geeks. Our brushes with boneheadedness extend beyond one-finger-saluting people who change lanes without indicating. We're frequently using, or even creating, very complex systems intended to let humans do things more easily. And systems that assume the user will be clever all the time are, famously, likely to be fragile and/or surprisingly difficult to use.

Anyone who's written a shopping cart application will have had to guard not just against wisearses who try to order -100 CPUs and be sent a cheque, but also against people who type their numbers in letters, or seem to want fractional quantities of motherboards.

Anyone who's designed a cable connector, or just used a lot of them, knows that for best results connectors should be *very* positively keyed, *very* dissimilar from every other kind of plug, and *very* tolerant of strange things happening to them. Connectors as regrettably similar as HD15 VGA and DB9 serial *will* be forced together by some of the people, some of the time. Even hard drive power connectors can, with sufficient enthusiasm on the part of the user, be inserted backwards.

Anyone who's received those anti-virus software bounce messages that tell you someone somewhere sent virus-mail with your address in the 'From' field will wonder why that software, in this day and age, *can* send such bounces. And why on earth the administrator turned that option on.

Clever people do dumb things all the time. Everybody screws up when they're doing things they don't know much about, of course, but people also suffer occasional brain fade even when they're operating within their field of expertise.

Exactly how and why this happens is now a serious field of study, where the fields of psychology, ergonomics and game theory collide.

Game theory started out as the study of the best choices to make in various strategic situations. This encompasses things like big business and international diplomacy; we're not just talking backgammon and the Prisoner's Dilemma here.

> Anyone who's written a shopping cart application will have had to guard not just against wisearses who try to order -100 CPUs and be sent a cheque...

An early criticism of pure, basic game theory was that it didn't apply well to the real world. That's because real people don't act like the capitalist superbrains in Ayn Rand books. Real people don't judge relative risks well, don't research their decisions, are easily persuaded by faulty logic (especially when they think a decision doesn't matter much), get tired, drunk and distracted, and sometimes just plain don't bother to think about things.

For this reason, lots of game theorists today are working hard on figuring out why people so often make lousy decisions. The results of this work are finally starting to give us real predictive power over things like stock market bubbles (and other forms of gambling...), riots, and mass hallucinations. We're still a long way away from Isaac Asimov's 'psychohistory', but it's looking a lot less ludicrous today than it did 20 years ago.

Back in the warmed-by-PCs home of the typical Atomician, a simpler understanding of human goofiness can bear fruit in all sorts of ways. You don't need a deep comprehension of the exact ways in which normal, intelligent people can seem totally imbecilic, but being mindful of the fact that it happens – and that you're not immune – is a helpful thing, even when all it does is make the world less confusing.

Why do people waste their team's time by hovering valuable, vulnerable Raptors around the top of the central tower in UT2004's Torlan map? OK, maybe because it's just fun to use the Redeemer that spawns up there, but more likely because they've misjudged the risk-to-benefit ratio of this tactic, versus using Raptors for more prosaic tasks or just grovelling around on the ground with the rest of us.

Why should you make regular backups? Partly to guard against hard drive failure and similar betrayal-by-hardware, but mainly because sooner or later you *are* going to confidently instruct your PC to destroy your data. Even if you have to click more than one 'Yes, I'm sure' button to attain this goal.

Why do last minute 'sniping' bids work on eBay? Shouldn't everybody just bid the amount they're willing to pay, whenever they like?

Well, yes, they should, and if we all had encyclopaedic positronic brains then we probably all would. But the game theory tied up in *this* goes on for page after page; it's based around the fact that people aren't sure what many things are worth, especially based on the imperfect information about things that are provided by many eBay sellers. When you bid early, especially if you've got lots of feedback, you push up ignorant buyers' valuation of the item, and make things harder for yourself. Hence, sniping.

When you spend a lot of time with the relentless, if at times unfathomable, logic of computers, the behaviour of mere humans can seem like a cryptographically sound random number source. Dig a little deeper, though, and psychological pay dirt awaits.

Win!

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Teenage Tux

With the changing landscape of licensing software and the rapid development of Linux, the IT community is wont to ask the perennial question: has the penguin finally come of age? Ashton Mills investigates.

A few years ago I suggested that Linux, despite many naysayers, would be ready for the desktop in only a few years. Then, as now, it had all the functionality and features to make it a kick-arse desktop system – it just wasn't easy to use. To be fair 'easy to use' is like beauty, it's in the mind of the beholder. For hardcore geeks, Linux made a fine desktop system. For everyone else, well, they were left scratching their heads and wondering what happened to the start bar.

But not anymore. Tux is growing up, and as his manners grow from a demanding infant to a mature young adult, he becomes increasingly amicable. And not just for new users, but for long time penguin addicts too.

Linux has always been on my system in one form or another. It can't not *not* be, exhibiting a naturally *Atomic* nature as it does. But over all these years it's never been my desktop. My desktop has been, like most people's, Windows.

Games are one key reason, but it's actually not the most important one. It goes like this – sure, Linux is the operating system equivalent of sex on legs, but to get a useable and functional desktop requires that you spend the time, sometimes a great deal of time, moulding it from a bunch of applications and configuration files into something seamless and integrated. And frankly, after doing this time and again over the years with varying distributions, I simply cbf-ed anymore. With Windows I boot it up and everything works as I expect. All the features I take for granted in a desktop system link effortlessly in the Windows desktop, so I can get right on with the business of using it.

But that's changing now. KDE's recent 3.2 release is the first Linux desktop environment that finally seems to offer a high degree of seamless integration on par with Windows. It was there before in bits and pieces, but this latest release seems to bring everything together.

Gnome, the other white meat, is an infinitely impressive desktop written by very smart people, but it's still mostly a framework. While it promises more than KDE, it doesn't currently have the seamless integration KDE now exhibits.

Recently, after installing KDE 3.2 on my Gentoo Linux boot, I've noticed something. These past weeks my Linux desktop has gone from a bare plaything to having my work documents appear on it. I find my browser cookies are now firmly at home, I'm reading my mail from an inbox that sits on a Reiserfs partition, and I'm writing this in the oh-so-sleek KEdit text editor (KDE's equivalent of Notepad, which is often all I use to write). And every application I need is there from browsing to IRC, email to P2P, file sharing to DVD playback, right down to Steam (through Wine). Without intentionally deciding to make the move, I've subconsciously migrated to my Linux boot.

> Linux is as easy to use as Windows but doesn't fall prey to internet worms and costs a fraction of the Windows price to buy and support. No wonder Microsoft is worried.

Let's get one thing straight here – I'm a fussy bastard. I have high demands. Though I love Linux as an operating system, I wouldn't make a switch to a Linux desktop just for the novelty of it. My desktop has to be easy, consistent, and integrated perfectly with all its components and applications. It has to just work, without errors, without glitches, and without the need to excessively fiddle with it. So to my surprise I installed KDE 3.2 and found everything *just works*. It's not *quite* up to Windows standards, but it's practically sitting next to it and giving it a nudge nudge, wink wink, your days are numbered type of look.

And they very likely will be. Not because desktop Linux is necessarily a better choice than Windows, but because it now at least has that same holistic desktop approach while providing two benefits Windows can't: cost and security. Consider this: Microsoft's biggest customers are governments and fortune 500 companies. The US Army, for example, spent $US461 million on Microsoft licences last year. And the daily infection of worms and viruses on Windows systems isn't just an annoyance, downed machines and networks in corporations can cost millions of dollars in lost productivity each year.

So what, then, would it mean if Linux could provide not only reliable back-end server systems, but also complete desktop functionality as well? What's that you say? 'Linux is as easy to use as Windows but doesn't fall prey to internet worms and costs a fraction of the Windows price to buy and support.' No wonder Microsoft is worried.

Has Tux come of age as a desktop for Joe Random, or will it remain the domain of geeks, techs, and CLI junkies? While distributions such as Xandros and Lindows already make the case that Linux is ready for the desktop, I don't think it's there just yet. I seem to be using it as a desktop now, but unlike most office noobs I know what a power button looks like.

No, I think next year will likely see desktop Linux really taking off. And soon after this there'll be little reason not to be running a desktop-focused Linux distribution that's cheap, fast, stable and secure in all the ways Windows isn't.

For now at least when I get the latest Outlook virus in my mailbox I don't have to wonder whether it's one step ahead of Microsoft's patch crew, it's simply powerless in my realm. And Windows, my old friend, is becoming just my games boot. I, for one, would never have thought it!

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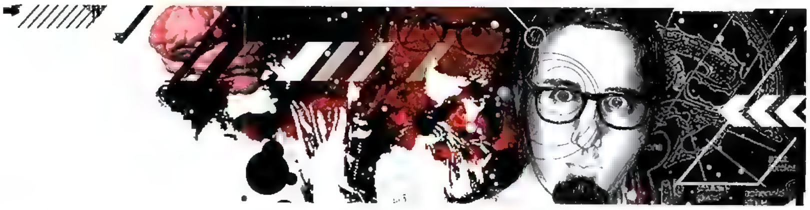

Interface to consistency

Tim Dean is sick of rebinding all his keys every time he fires up a new game. When will he, or the industry, learn?

Complexity is a funny thing. I remember having one debate with a girlfriend several years ago about whether she was 'complex' or 'complicated'. It was an interesting, and stimulating dialogue, and one that didn't go without its repercussions. Here's a tip – never call a girl 'complicated'.

Anyway, given the barren wasteland of PC gaming today – a veritable desert riddled with mirages, skeletal remains and broken console ports – I've been browsing through my archive of games and installing all the choice morsels the last four or five years have left us.

One thing that has really struck me as I've blasted through the past are the differences, and similarities, in interfaces between games.

It's interesting because unlike (or like) many other industries in the world, it seems as though the gaming pantheon love reinventing the wheel. (I tried reinventing the wheel once. You know, it's harder than it looks. I ended up with an obloid, sphericon then a rhombus – all huge failures – although paling in comparison to one that closely resembled the Segue.)

See, it might be my philosophical background, and rabid pursuit of one and only one truth, but I can't see why two similar games can't have two similar interfaces. It just seems logical.

There is certainly resemblance – the olde W-A-S-D config for FPSs, for example – but there is still far more variance between games than there probably needs to be. Sure there are new controls needed from time to time, such as leaning left and right, or going prone, or team communications, but even then, there's plenty of the core stuff that can remain the same.

Take panning and rotating the camera in 3D RTSes. I've seen games where panning is done with the middle mouse button. Others with the right mouse button. Others where you drag the scenery around. Others where you move the mouse to the edge of the screen to pan. It's just not on. We demand consistency!

It's not that easy though, granted. This is where the complexity comes in. The simpler something is, generally the simpler the controls need to be to direct it. The more complex something is, and the more it can potentially do, the more complex and flexible the controls need to be to accommodate that. As such, of course we're never going to have one fixed standard, but I'm sure we can find some consistency.

> It might be my philosophical background, and rabid pursuit of one and only background, but I can't see why two similar games can't have two similar interfaces. It just seems logical.

Think about planes. The Wright bros plane had only two controls – a stick to move the elevators and a kind of cradle thing to move the ailerons and rudder. While the cradle turned out to be bollocks, the stick has remained to this day in a very similar role to its original implementation – ie. making the plane point in the right direction.

Since then plenty of other controls have been added to aircraft cockpits, but the core stuff remains the same. Take the Space Shuttle. It packs a whopping 2,020 controls (including displays) on its flight deck. As far as I know, that's the most number of controls on any aircraft ever – although I'd be happy to be corrected on that.

So, even though the Space Shuttle has more controls than Jamaica has ganja, there's still a stick, rudder pedals, altimeter, artificial horizon etc.

So even with the vastly higher complexity of the Space Shuttle, or even a 747, there is core functionality that remains the same – and we've already stumbled across the best human interface to control this functionality.

Surely we can do the same when it comes to games?

All I want is for a little research to go into the optimal configuration for general types of games, from FPSs, to 3D isometric, to flight sims, to RTSes etc, then for developers to stick to those defaults unless there's a compelling reason not to.

So if the developers are making arbitrary decisions about where to put keys, then they can stick to the established guidelines. Then the developers can spatter key bindings around the joint as complexity requires. They can also provide us with multiple built in default bindings to cater to different audiences.

Sure, I might be aiming high with this crusade. Granted, there are many variations of games with different requirements for controls. Fair enough, there are plenty of people out there with subtly differing tastes when it comes to their preferred configuration within just one game (just take a snapshot of console controller options, or Counter-Strike configs).

But next time you fire up a game, take note of any controls that just aren't where you think they should be. That drop weapon key that is not on F or G; that 3D panning that always seems to swing the other way than the one you expect; the walk key that is on Alt instead of Shift; the radio communications that seem to be randomly spread among a half dozen keys.

Remember these aberrations. These insults to our gaming experience. These veritable slaps in the face by developers who haven't done their homework. Remember and build your fury. Build it until you're ready to burst.

Then unleash it when those around you least expect it, in ways they can't imagine. As, unfortunately, that's about all we can do for now.

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1 TDK Armour Plated 4x DVD-R

Supplier: TDK
Website: www.tdk.com.au
Phone: 1300 305 835 **Price:** $9.95

These pricey DVD-R discs promise 100x more scratch resistance than standard DVD-Rs. Laughing evilly, off we trotted, testing from floor scratches to 'oops, I scraped scissors on it'. Compared to cheap $2.50 A-Grade Princo DVD-R media, it holds up in real world situations and ignores even extremely harsh industrial-carpet rubbing. The Princo instantly gave way to the carpet, however their top surface is much stronger than the TDKs, barely letting any sharp object through.

2 Lite-On External LDW-851SX DVD+/- RW

Supplier: Synnex
Website: www.synnex.com.au
Phone: 1800 880 038 **Price:** $429

DVD burners just keep getting cheaper and faster. While internal burners now support both 8x +R and 8x -R formats at obscenely cheap prices, Lite-On's USB external burner, the LDW-85SX delivers portable 8x +R and 4x -R performance for about $200 more than the internal kind at the time of writing. It's a tasty option if you need portability, but for most uses the faster internal models are almost too tempting to pass up on.

3 Belkin Hi-Speed USB 2.0 7-port Hub

Supplier: Belkin
Website: www.belkin.com.au
Phone: (02) 4325 4666 **Price:** $89.95

It's a sleek and sexy 7-port powered USB 2.0 hub. It's very well designed and compact, but because it's a *powered* hub, the power pack for this super slick hub was bigger than Fat Al himself. Outputting a reasonable 6 volts with a behemothical current of 4 amps – this provided each port with almost 600mA, but at a nasty cost. Unfortunately they didn't want to run as passive hubs – requiring juice to function. They stacked nicely, but a power pack was needed for each hub. Split 8 amp power pack anyone?

4 Digitech IR Non-Contact Thermometer

Supplier: CoolPC
Website: www.coolpc.com.au
Phone: (07) 3879 2255 **Price:** $79

For those with a point-at-stuff fetish, this is bound to grapple you by the crotch. Via laser radiation and a red laser dot, it attempted to report (in either Fahrenheit or Celsius) the surface temperature of, well, surfaces, though we found accuracy greatly varied on different materials. The distance to surface size ratio is 6:1 so there was some degree of distance to play with before the laser missed the point. Not cheap or accurate enough for measuring chips, but a novel little doohickie none-the-less.

5 Flash 2 Advance

Supplier: CoolPC
Website: www.coolpc.com.au
Phone: (07) 3879 2255 **Price:** $149 (256MB); $246 (512MB); $368 (1GB)

Available in forms of 256MB, 512MB and 1GB, this kit for your GBA/SP allows the backup of GBA software and mini-movies to the writeable cartridges. The video playback is surprisingly good and the CD comes equipped with an AVI to GBA conversion tool, among others. You simply upload the .gba files, reboot the GBA, select the file you wish to play and hit start. The GBA will then restart into the selected file, whatever format it may be.

6 High Score! second edition

Supplier: McGraw Hill
Website: www.mcgraw-hill.com.au
Phone: (02) 9900 1800 **Price:** $39.95

Every time we think Americans noticed the rest of the world's existence, something like this book shows up. A mildly entertaining Yankocentric look at the electronic gaming's history, updated with token appendices about the UK and Japan. It's interesting, but frankly any book on this subject that mentions a game like Syndicate once, as a sequel to Populus, is disappointing indeed. A better game nostalgia trip can be had by heading to www.the-underdogs.org.

7 Bitspower RAM LED mod

Supplier: PC Range
Website: www.pcrange.com.au
Phone: (08) 8322 9544 **Price:** $19.95

It's now uncommon to *not* see lights in boxes in some form within the domain of our wonder loves. Basically it's a non-intelligent standard flashing light kit that can be fitted to your memory. This array of LEDs for your memory pushes in the direction of the brightest box. In a semi-unconscious way, the mod geek is truly attempting to fit every square millimetre with some form of light emitting widget. With eight different effects, this should be satisfying (though we found the button to be a little 'sticky').

8 Thermaltake UV ATA cables

Supplier: Anyware
Website: www.anyware.com.au
Phone: (07) 3856 3999 **Price:** $19.90

You can pop these cables into a tank (or perhaps even your case) and you won't be accused of being a mad molecular scientist experimenting with fluorescent genes. Maybe not. Well, you don't have to feed these. Other than the trippy UV tubing, these are just your regular stock standard Parallel ATA133 cables. As the pathetically primitive human eye can't depict actual UV light rays, grab a black UV light to see the trippy effect UV rays have on the tubing.

Hotbox

Holdenkicks' Blue Beast V4

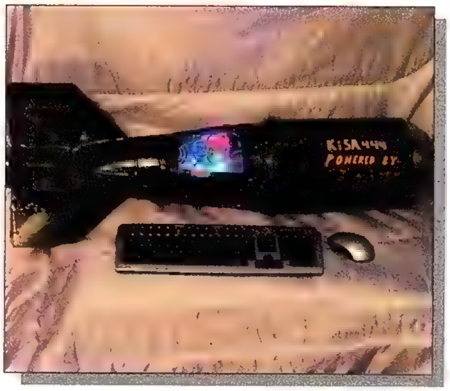
Technical details

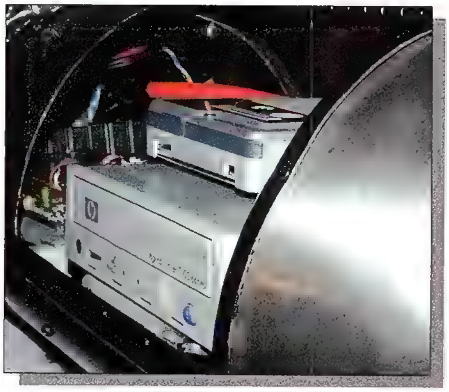
- Two 30cm UV cathodes
- Keylock power switch
- Custom window fan hole
- Bright blue power LED
- Blue interior
- Digidoc 5
- Four-channel fanbus
- 16 x 2 DSE parallel LCD
- Blue UV reactive PSU cover
- Blue UV reactive IDE cable
- Athlon XP 2800+ @ 3200+
- 512MB Corsair DDR400
- 9600 PRO VIVO

First, I'd like to thank Amanda and Bob, without their help Blue Beast would not be where it is today. Eighteen months of work has been put into modding Blue Beast. I had the fan hole in the window cut especially to look like a 5-spoke mag wheel. Two UV cathodes light up my UV fan, UV IDE cable, the window moulding and the blue UV paint I put on the CPU and Northbridge fan. Blue UV paint was used to paint the 'hands' on the window, which is lit up using a UV laser-LED.

I have fitted two fold-down case handles on the top, and a keylock switch (like a car's ignition) in place of the power button. The exterior has been sprayed using highly reflective, dark blue paint. The front 120mm fan hole was cut to allow for better ventilation for my hard drives, while the drive bay covers have been sprayed black to match the front 120mm fan. The homemade backlit 16 x 2 LCD is used to display uptime, Winamp info and CPU/RAM utilisation.

Chris' Bomb





Technical details

- VIA EPIA v800 mobo
- C3 800MHz processor
- 512MB PC 133 RAM
- Onboard sound and video
- Hewlett Packard CD/RW drive
- Western Digital HDD 3.2GB
- Two 80mm Antec LED fans
- 120mm cooling fan
- One CPU cooling fan
- Bomb-like side writing
- Custom wiring
- Shiny nosecone
- Aerodynamically efficient

This is my Bomb PC, the KiSA_444. What started off as a discarded MK-81 bomb tail assembly that was waiting to be recycled has been given a second life as a Linux box. I salvaged and scrapped pieces and parts from other cases to make the rest of the system enclosure.

What I couldn't get from other systems, I made from sheet metal, or plexiglass. And the nosecone was built by hacking up a stainless steel mixing bowl.

Every wire in the system had to be customised in one way or another. Some were shortened, some lengthened and for the CD/RW drive I had to completely remove the Molex connector and use heatshrink tubing on the metal connection pins to keep the power from shorting.

While quite large, I'm confident that my PC is one of the most aerodynamically efficient PC cases in the world. With the possible exception of the Apple Cube.

I am always hungry, I must always be fed; the finger I lick will soon turn red.

The Firebox

Technical details

- Modified Skyhawk Galaxy case
- Pentium 4 2.4C@2.7GHz
- Thermaltake Volcano 7+
- MSI 875P Neo motherboard
- 2x 512MB RAM sticks in dual-DDR
- Onboard sound and Ethernet
- Netgear FA311
- MSI NVIDIA GeForce MX440
- 20GB Seagate
- 80GB Seagate
- LG 50x CD/RW – painted red
- Matrix Orbital MX212-24 USB
- MSI TV Anywhere

Firebox started as a normal out-of-the-box Skyhawk Galaxy case with blue LEDs in the front bubble tube. Everyone at that stage was on the 'blue' wagon, so I decided on a red theme.

LEDs were replaced and LED fans installed. I got a bit creative and arranged some red EL wire on the side of the drive cage and installed a red cold cathode on the bottom of the case. An ultra bright red LED shines on the Volcano 7+ CPU heatsink. An inverse red Matrix Orbital LCD display on a blank drive bay cover connects to an internal USB header on the mobo. This took quite a bit of time to mount properly.

After a month or so, the red was too much so I made a switch bay to turn each lighting feature on and off. I kept the theme using red illuminated push buttons. As with the LCD display, they were mounted on a blank drive bay cover, keeping a uniform look.

Watercooling of the CPU and chipset is next on the agenda, and it's time I upgraded the video card.

Kozen's Tron Box

Technical details

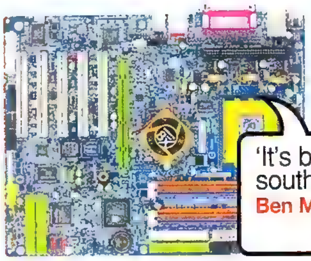
- AMD XP 1800+
- MSI KT4 Ultra-FISR
- 512MB PC2700
- GeForce MX440
- 120GB WD w/ 8MB buffer
- 80GB WD w/ 8MB buffer
- LG CD-RW
- LG DVD-ROM
- L.I.S LCD
- Volcano 9 CPU fan
- Antec 480w PSU
- Neon up the ying yang
- Top extraction

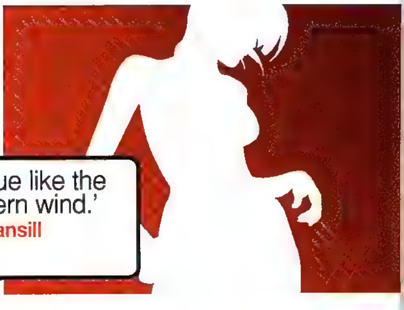
I first built this machine about a year ago, and have slowly added onto it. It started with just the Skyhawk Jupiter case and Antec true blue 480w PSU, then I added the blue LED case fan, another couple of case fans for HDDs, etc, one for the graphics card, and finally a window and an extraction fan on the top of the case. The top fan is great for drying sweaty-mouse-hands. I also added a bay of switches to the front to control lights and the LCD display on the front. Recently I added the motherboard POST display to the front of the case, and also put UV-green cable sleeving throughout, and replaced all the Molex connectors with UV reactive blue types. Lights include a 12in blue neon, a 12in UV neon, a blue LED spotlight, four blue LED case feet, and a blue EL-cable that snakes through the inside of the case. Finally, I removed the perspex side window which I replaced with a dust-filter.

Hotbox of the month wins the Gigabyte GA-7NNXP!

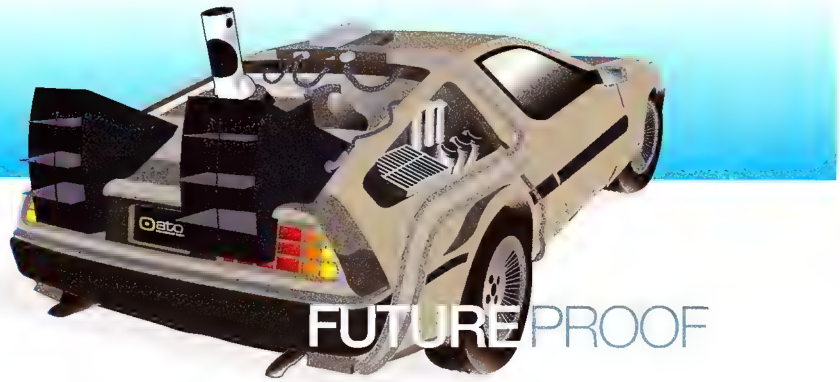
Vote for this month's hottest Hotbox at www.atomicmpc.com.au. Voting closes 21/04/2004. Send your Hotbox pics and 200-word description to *hotbox@atomicmpc.com.au.*

- NVIDIA nForce2 Ultra400 chipset
- SATA and PATA RAID support
- Dual DDR400
- AGP 8x
- Gigabit LAN + 100Mb/s LAN
- IEEE1394 + 5.1 surround sound





'It's blue like the southern wind.'
Ben Mansill



Novel technology

Proving that science fiction is not just about rockets and replicants, Neal Stephenson talks with John Gillooly about the state of technology today.

Neal Stephenson is one of the most influential science fiction authors of the past decade; in *Snow Crash* he envisaged the 'Metaverse', a 3D internet that John Carmack from id software has repeatedly expressed a desire to replicate, while *The Diamond Age* provided one of the most enduring visions of a nanotechnological future to date.

With 1999's *Cryptonomicon* he began to look into the history of computing and information technology as World War II's codebreaking efforts acted to push the development of computing machines towards what we know and love today.

Late last year he released *Quicksilver*, the first book of the Baroque Cycle, a three-part prequel to *Cryptonomicon*. Stephenson recently visited Australia to promote the second book in the Cycle, *The Confusion*, and he found time to chat with *Atomic* about the current state of science and technology.

Why did you choose to go back in time with the Baroque Cycle?

That can get into a slightly long story so if it's more answer than you want let me know and I can give you a short version. There has been a bit of a move, I think, in science fiction literature to go back and look at the historical antecedents of the information age, or the age of information, technology, whatever you want to call it... *The Difference Engine* by William Gibson and Bruce Sterling was an example of that. My previous novel, *Cryptonomicon*, was set half in the present day and half in World War II and it was about the beginnings of the modern information tech economy and the codebreaking projects of the Second World War. And as I was working on that, I slowly become aware that the history of computers and symbolic logic and thinking about information in that way actually went a lot deeper than Turing or even Charles Babbage. It went back at least as far as the age of Leibnitz.

So I started thinking it would be fun to try to write a book that looked at that age through the lens of modern computer-aware people and one thing led to another.

Do you think much has changed with people's perception of science since that time?

Well the word science didn't even exist – the word existed but it meant something different. We didn't start using the word science in its current meaning until the 1830s, and it was actually popularised by Babbage and his circle. But these people instead called themselves natural philosophers and their whole idea was that they were going to philosophise but they were going to base their philosophy on observations of the world. So I don't think that they saw a clear dividing line between what we would now call pure philosophy and theology and religion and science, it was all kind of one big thing to them. Now we do observe, for better or worse, clear divisions between those disciplines, and that's the biggest thing that has changed I think.

Is science and technology a faith thing as well?

I think that those are all ways of trying to get at the truth and trying to understand what our situation is in the universe; and over time they have become somewhat estranged from each other. When you say faith, what that implies is where people decide to accept some kind of premise without any proof of it. Scientists aren't supposed to do that sort of thing, some people believe that they do it all the time but I'm not quite that cynical about science.

But there is always a lot of going out on a limb with science in the initial phases anyway. . .

I mean, people do buy into certain scientific premises so that they can do further work and extend the frontiers of science but I think that science is fairly good at questioning premises and tearing them down when they need to be torn down.

Do you think that nowadays technology and technology marketing devalues a lot of that pure science?

...I wouldn't quite say devalues, I think that for a lot of people the distinction between science and technology has become a bit hazy. And it's because people are dealing with technology all the time and it sort of works or it doesn't. Either way most people that use it are divorced from the underlying science of how it all works. So you get a lot of people who can write programs or configure a computer to perform certain tricks; the early computer people probably knew their way around a soldering iron, understood the principles of electronic circuits and could put these things together from scratch if they had to. But now everything is at the level of chips there is no way for any normal person to peer inside a chip and understand how it works, so I think a lot of that contact with the underlying science has been lost.

What aspects of modern technology interest you?

I'm less interested in 'technology' as that word is conventionally used. I'm more interested in stuff that actually works. For

example, I'm sorta fascinated by tyres, which we don't think of as technology. Look around on the street at all the traffic that's going around on tyres, occasionally you'll see somebody by the side of the road with a flat but it basically never happens. I've driven a car everyday for almost all of my adult life and I've had maybe two or three flat tyres in my life. And when you think about the horrendous conditions and the pounding that tyres have to absorb, it's just miraculous that they do as well as they do. And all around us there are technologies that we don't notice like buttons and scissors that really perform pretty magnificently and I find it amusing to contrast that with a lot of information technology, which is just ludicrously frail and cantankerous.

Do you think this a side effect of the ridiculous time frame at which this stuff is being pushed out?

> "...a lot of information technology...is just ludicriously frail and cantankerous"

Oh yeah, to be sure, clearly people are under pressure. The engineers who develop this stuff are under great pressure to get something out the door from the marketing and business end of the companies that they work for. And that's not always conducive to writing good code and producing a stable product. One advantage of open source for example is that kind of pressure doesn't really exist. If you are some guy responsible for maintaining this or that package you're going to get your next version out the door whenever you are good and ready and not because some manager is poking you in the shoulder asking when it is going to be done.

Do you think the open source movement is here to stay?
It's notoriously hard to predict the future of social behaviour because it can change, for reasons that aren't obvious to us, overnight. When I first became aware of it I couldn't quite believe it and I was sceptical that it could continue to exist but it clearly has developed a kind of long term stability, that is if you consider 10 or 15 years to be long term. And as far as I can make it out it seems to be pretty well entrenched at the moment.

I guess the only danger is the stuff currently going on about IP and patents in the US. Do you think that is dangerous?
Are you talking about the SCO thing?

The SCO thing and generally the way that technology is being patented and retroactively enforced.
The last time I looked in on the SCO thing it didn't look like they were having a lot of luck. The patent thing is a bit of a mess, because people who work at a company are basically obligated to pursue as many patents as they can, it's just part of the fiduciary responsibility to their shareholders.

They have no alternative but to pursue patents as aggressively as they can, but they are doing it through this governmental apparatus that was invented back in the age of steam engines and so it's turned into a peculiar situation.

People talk about reforming the patent office; at least they talk about it in the United States... But it's a very complicated and ancient institution and it's hard to go in and monkey around with it without inadvertently screwing up something else.

John Carmack from id software has been quoted many times about wanting to create a version of the Metaverse. Do you think we need it?
There doesn't seem to be a lot of demand right now for people to go into fully immersive 3D environments. I think that anything like that is going to be demand-driven.
There is always going to be some gamers and enthusiasts that want to spend their time and money on that kind of thing and I think that the game market is certainly going to meet their needs. I don't see a lot of ordinary people clamouring for the opportunity to go into a Metaverse-like environment and I think one reason for that might be that most people who have desk jobs now spend their entire days sitting in front of a computer staring at pixels and when you have spent your whole day doing that it's not necessarily your idea of a good time to sit on your arse with more pixels to look at.

So there is an issue of demand to be settled first and that comes down to this, can developers come up with applications or things to do in that virtual universe that are interesting to people?

What computing hardware do you use?
A couple of years ago when Mac OS X came out I got a PowerBook and really I have never looked back.
Up to that point I had a couple of Linux boxes which I built myself and set up, and for a while I even had a Be Box. But OS X was so satisfactory that without really meaning to I ended up doing everything on that machine and before I knew it a year had gone by and I hadn't booted up my other hardware in months and all my stuff was on the Apple.

Now I've got the big one – the 17in PowerBook – but that's because I had become so dependent on the first PowerBook that I realised if it got stolen or dropped I would just be screwed.

So now I have a few Macs and try to back them up onto one another so that I won't get hammered if one of them gets hurt.

ShortCircuits

- Sick of only being able to squeeze 4.7GB of porn onto a blank DVD? Well fret no longer because dual layer DVD+R recorders will hit the market soon, upping the capacity to 8.5GB on a single sided, dual layer disc. The standard goes by the sexy DVD+R 9 moniker and initial offerings from Sony will have a dual layer burn speed of 2.4x alongside support for 8x burning of normal +R and –R media.

- The sheer industry power of Taiwan's semiconductor makers has been highlighted in a list of the top contract semiconductor foundries for the last year. Unsurprisingly TSMC tops the list with a whopping US$5.85 billion in revenue, followed up by its closest competitor UMC with US$2.739 billion. But the gulf really shows with third-placed IBM, whose revenue was a comparatively paltry US$800 million.

- It has been a long time since we have had a chance to use the term 'Megahertz Myth' in *Atomic*, so we were happy to hear Intel announce a move to model numbering of its desktop and mobile product lines. Unlike AMD's PR ratings, Intel's new numbering system is not strictly performance based, rather it combines speed with features like hyperthreading and front side bus speed to come up with a ranking. The numbering will be introduced with the Dothan cored Pentium-M CPU towards the middle of the year before flowing on to the upcoming LGA 775 Pentium 4 CPUs. Intel has not yet decided whether numbering will be used for the Xeon and Pentium 4 Extreme Edition products.

Moddin' It

Console mod-chipping is an unholy hack, to some. Bypassing the traditional debates, Phil Chia simply examines how these backyard mods actually function.

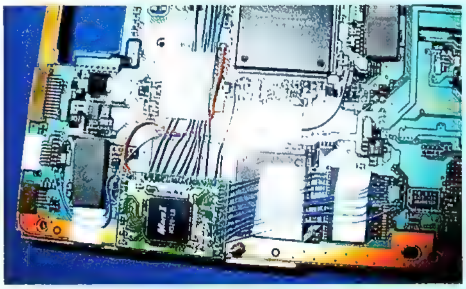
It could be said that the PlayStation 2 gave birth to a new generation of consoles that started to bridge the gap and blur the lines between PCs and gaming consoles, which heralded the creation of gaming appliances.

Prior to the PS2, consoles were limited in graphical and audio quality. PC games on the other hand were pushing out graphically accelerated high-resolution goodness in near-CD quality surround sound making it the platform of choice for developers to showcase their wares.

It's logical then that such a system would generally be out of the reach of most consumers. How then could the PS2 be released at $799, and now even at $330? The answer lies in Sony's marketing model. Simply put, Sony subsidised the price of the consoles, banking on the fact that they would be able to recover the subsidy through the sale of games. For every PS2 game put out on the market, Sony gets a royalty and a fee for Quality Assurance testing. In this way, Sony makes back the subsidy after the consumer purchases eight games. It is the success of this marketing model that prompted Microsoft to follow suit and enter into the console market. The difference is that the Xbox's hardware is much more expensive than the PS2. In Microsoft's model, 12 games need to be sold before the cost of the console breaks even. It is for this reason that both companies are so defensive about any modifications to their hardware.

But that of course hasn't stopped modders from creating customised BIOSes which make these consoles do everything from functioning as a Linux server to streaming media.

The current legal debate in regards to these modchips however is quite interesting in Australia, were the ACCC has effectively described the practice of region-locking DVDs and games to be anticompetitive. Additionally, under current legislation, it is also not an offence to create legitimate backups of software. This is where a common misconception comes into play. While you can indeed legally make a backup of a computer program, backing up games is a different kettle of fish. As the Australian Copyright Council (www.copyright.org.au) puts it, 'Since computer games also involve other copyright material, such as films, music, sound recordings and artistic works, they cannot be copied under this provision'.

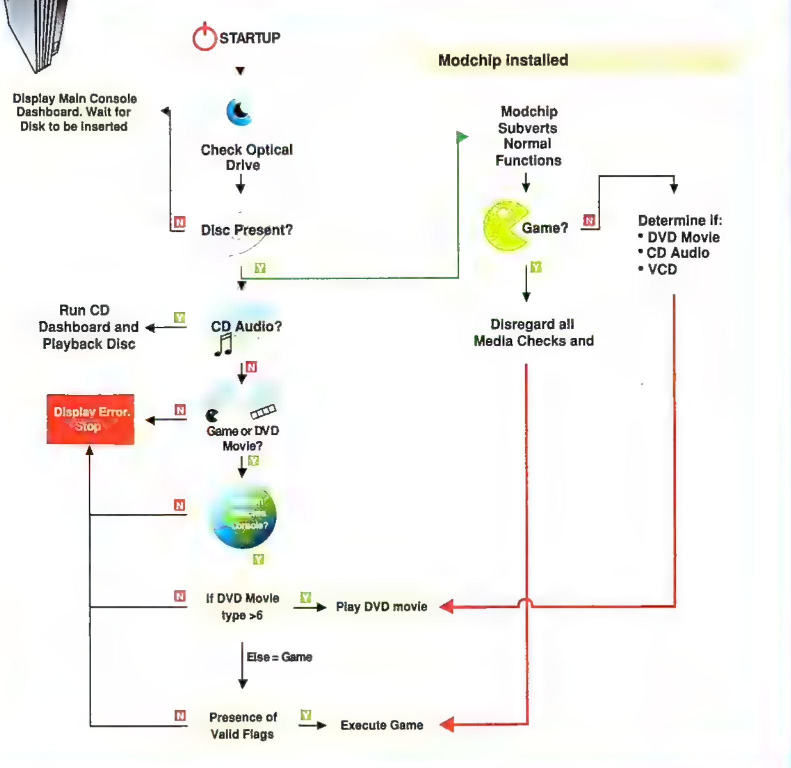


ABOVE: The attention to detail required to mod a PS2. Ultra-fine gauge wires and a knowledge of surface-mounting soldering is a must. The guys at GameFix, a console repair facility, say that the number one user repair is when someone tries to mod a PS2 without the proper knowledge and equipment.

It's AJB Publishing and *Atomic's* stance that piracy is illegal and hurts the developers that make the games we love. Period.

The PS2 story

Although it's starting to become a little dated, the PS2 still has surprising grunt. With only 32MB of onboard system RAM, it represented a developmental challenge to software designers as the PS2 has no other means of data storage, barring a memory card for savegames. Although the PS2 platform has a huge variety of games available, Australia and other PAL nations only get approximately 25 to 30 percent of the total titles available to NTSC regions such as the USA and Japan. Just like DVDs, PS2 and Xbox games are region-locked, making the loading of overseas games, even if legitimately purchased, impossible. Add to this the annoying feature that a standard PS2 does not playback DVD-9 dual-layer discs, which are quickly becoming the most popular distribution format for DVD movies. So forget about playing *2 Fast, 2 Furious* after a hard session of Grand Turismo 2.



ABOVE: This flow diagram illustrates how the modchip effectively hijacks the PS2's detection circuitry and executes games or starts playback of DVDs.

Boot up

When the PS2 boots, it first checks if there is a disc in the drive. It then identifies whether it's a valid DVD, CD or game disk.

DVDs and games are checked for validity against media descriptor flags, such as region coding and video format. The regional settings are factory set, and the PS2 will only accept discs that match this setting. Therefore, region 0 or international discs will not play properly, however a small number of region null discs will be accepted. In Australia, only PAL region 4 discs will play; even a region 4 DVD encoded in NTSC will be rejected.

PS2 game discs are specially manufactured with specific blanks in sectors. These blanks serve two purposes. Firstly, blank sectors will usually cause copying software and normal optical drives to fail. Even with bit-copy software, most writers will still burn in nulls instead of no-data in these sectors. This itself acts as a crude copy-protection system. Secondly, these blank sectors also act as media descriptors providing verification of the disc's region zoning etc, depending on their position on the disc.

PS2 modchips basically suppress the need for the PS2 operating system to verify these media descriptors. The existing generation of PS2 chips actually hack directly into the BIOS firmware on the motherboard. Thus, a modified console will allow unimpaired playback of DVD movies as well as the playing of imported and backup games.

In all, PS2 modchips effectively make the console function 'as advertised,' by removing the restrictions on DVD movies as well as allowing users access to the US and Japan games market. Sure, there's the potential for piracy, but to the average Joe, Sony's current protection restrictions are Draconian.

After all, the general user simply wants to play back their legitimate movies and games purchased over eBay. According to a spokesman from GameFix, the argument over exclusive Australian distribution rights with games is nonsense as the majority of PS2 titles that are available overseas are simply not redistributed in Australia.

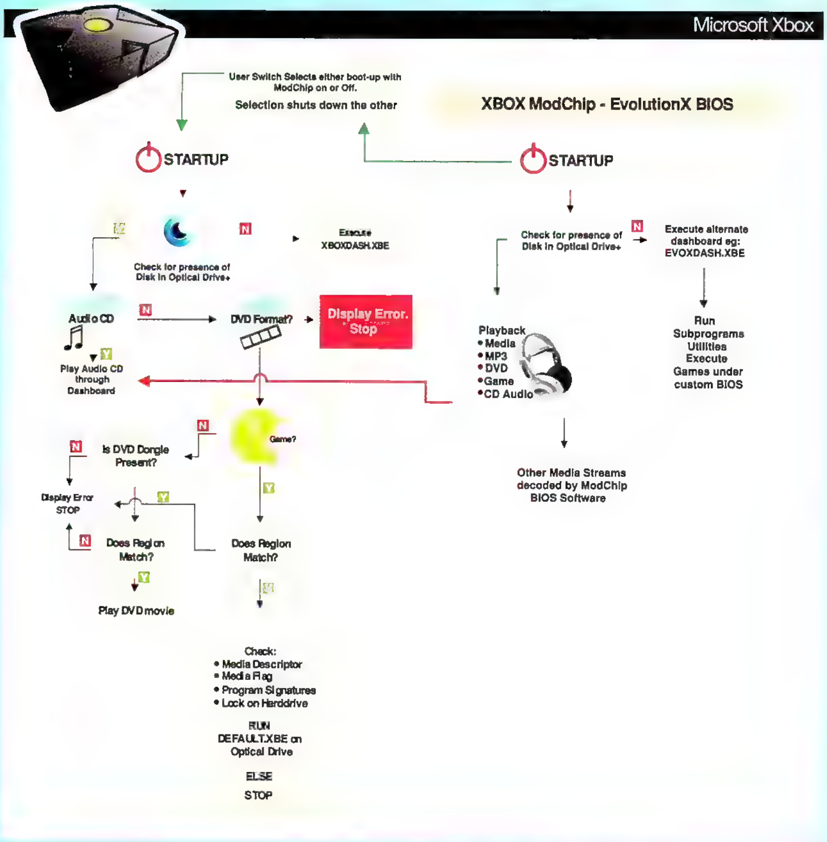
If this revenue stream was so important to the local distributors, the solution would be simple – just release the games that people are purchasing from overseas! But things are never that simple.

The legitimacy of PS2 modchips is currently under scrutiny in Australia. Under section 116A of the newly passed Digital Amendments Agenda (2000), it may be read that circumvention devices fitted to consoles are illegal. However, this poses a perplexing issue as under current legislation, it is legal for a user to create backups of software for personal use. Also, the ACCC has deemed software (and DVD movie) regioning to be illegal and anti-competitive!

Basically, one of the principal arguments about modchips being 'circumvention devices' has its basis in the way that the current generation of chips are installed.

As shown by the schematic, PS2 modchips are soldered directly onto IC pads and effectively 'hijack' the instructions coming off the console bus, thereby circumventing and infringing on sections of Sony's Intellectual Property (IP) and Technical (sic) Protection Measures (TPM).

The current Sydney test case of *Sony v Stephens* highlights some of the quandaries in Australia. Final submissions on this case are expected towards the end of April, so watch this space for updates.


Microsoft Xbox
User Switch Selects either boot-up with ModChip on or Off.
Selection shuts down the other
XBOX ModChip - EvolutionX BIOS
STARTUP
STARTUP
Y
N
Execute XBOXDASH.XBE
Check for presence of Disk in Optical Drive+
Audio CD
N
DVD Format?
Display Error. Stop
Y
Play Audio CD through Dashboard
N
Game?
N
Is DVD Dongle Present?
Display Error STOP
Y
Y
N
Does Region Match?
Does Region Match?
Y
Y
Play DVD movie
Check:
• Media Descriptor
• Media Flag
• Program Signatures
• Lock on Harddrive
RUN
DEFAULT.XBE on Optical Drive
ELSE
STOP
Check for presence of Disk in Optical Drive+
N
Execute alternate dashboard eg: EVOXDASH.XBE
Playback
• Media
• MP3
• DVD
• Game
• CD Audio
Run Subprograms Utilities Execute Games under custom BIOS
Other Media Streams decoded by ModChip BIOS Software

ABOVE: Functional operations of the Xbox console, and a comparison to the PS2 as to how the mod chip intercepts the initial BIOS call. Unlike the PS2, the Xbox mod chip does not rely on the code of the original BIOS.

The Xbox

Unlike the PS2, the Xbox is more a purpose-built PC rather than a purpose-built proprietary console, and is therefore much more sophisticated in terms of flexibility and capabilities. Two advantages that the Xbox has over the PS2 are the fact that it has more system RAM and the presence of a 8GB hard drive.

Based around a 733MHZ Mobile Celeron with a 133MHz FSB and a customised NVIDIA data bus, it shows its heritage in PCs by the way it functions. On the PC, EXE and COM files are program files, while on the Xbox, .XBE files are executables.

Boot up

Like the PS2 on start up, the Xbox checks the status of its optical drive. If a disc is found, it verifies its legitimacy against the region coding and other media descriptors. Unlike the PS2, the Xbox will freely play any DVD that corresponds to its region coding, including region 0 and null-regioned discs.

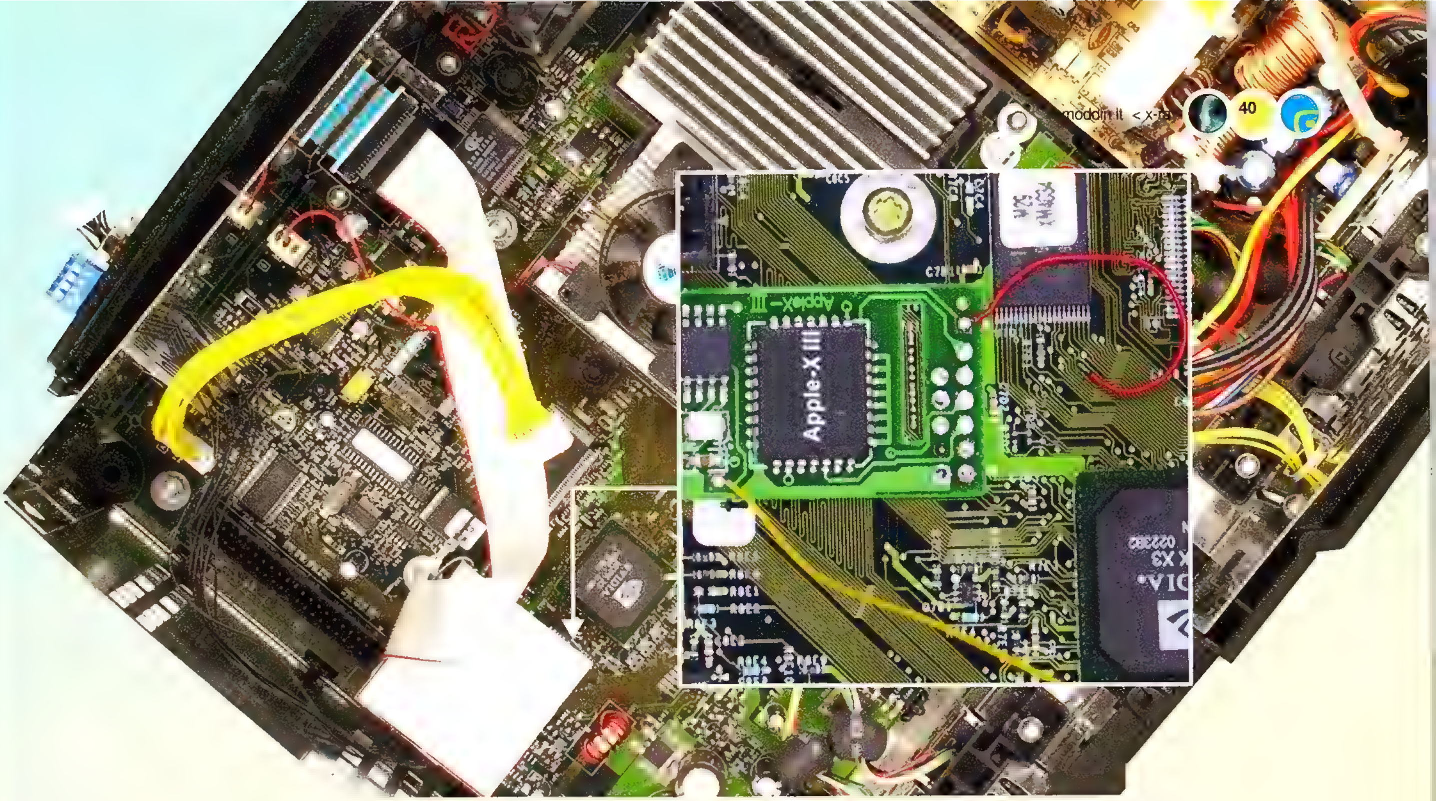
All Xbox games are burnt on DVD media, and if a game is found in the optical drive, several systems checks are made. Firstly, the BIOS checks the region coding of the game, much in the same way as a standard DVD movie.

Next, media flags are checked. Depending on the software house, a variety of protection devices may be employed, including the presence of dummy sectors (a la PS2), hidden code in dummy sectors, dummy unreadable code files and operating drive checks. Finally, as all games must be passed through Microsoft QA, digital verification signatures are checked on the files (much like how drivers under WinXP work). Before the game is run, the integrity of the encrypted hard drive is checked off. If all these are green, then the 'DEFAULT.XBE' file on the disc is run.

If no disc is found in the drive, the Xbox then defaults to the hard drive, checking if the encryption is intact, or 'locked', before running XBOXDASH.XBE and bringing up the Xbox's control dashboard. Unlike the PS2, Xbox mod chips take advantage of the test/program pads on the motherboard to patch directly into the console's LPC bus.

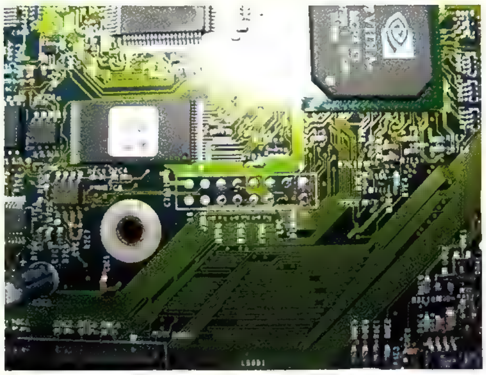
These pads are used in manufacturing to test and burn in the Xboxes and also to program the EEPROM and hard drives with a unique Xbox Console Identifier, or XCID code. What is interesting about these pads (sometimes referred to as the TSOP pads given its proximity to the TSOP chip) is that it is possible to ground-out the default Xbox BIOS and effectively shut it down, thus allowing an alternative BIOS to be used in its place. In this way, Xbox mod chips do not circumvent Microsoft IP or TPM, but actually replace it! This is best demonstrated by chips with the (in)famous Cromwell BIOS that converts the Xbox from a console to a fully-fledged Linux box!

Also, considering the Xbox mod chip links into the TSOP pads, which links into the system bus, as opposed to hijacking the BIOS, most are able to be flash-upgradeable again allowing a greater level of flexibility than the Sony's PlayStation 2.



ABOVE: The lovely insides of a modded Xbox. In the main image the mod chip is covered, so check the blow-up above for a peek.

There are many BIOSes available now that will make the Xbox anything from an Atari 2600 emulator to a Linux server, however most users will simply use a dashboard system such as EvolutionX. These dashboards give the user access to a variety of options, including running other programs such as XboxMediaPlayer, which can convert the console into a home-entertainment hub, allowing it to stream DivX movies from a server or even rip and play MP3s. A boon to gamers who run games with long-load times such as Capcom's Omnimusha, which has loads as long as three minutes off-disk, is the ability to rip the entire game to their hard drive. The current generation of software available on mod chips allows users to create functional backups of games to the hard drive while patching the game on-the-fly to simulate execution off the optical drive. The result: load times under 10 seconds!



ABOVE: An Xbox up close. The chip labelled M-29 4034 is the famous 'TSOP' chip that basically controls the BIOS. The pads shown here are used by Microsoft to do testing, flashing and programming of the chips. Modders exploit these same pads to link into the LPC (system) bus.

Legally, Microsoft is taking a slightly less militant approach than Sony. Microsoft knows of the presence of mod chips and the potential of piracy, however in line with Microsoft's overall strategy of dominating online console play, it seems to be taking it easy. One of the Xbox's principle selling points is it's ability to run online using Xbox Live! The Live! service is pay-for and requires an annual subscription, thereby securing the company a long-term, constant stream of revenue. Most of the 'premium games' on Xbox feature support for Live!, and this itself guarantees a level of copy protection if you had plans to use your Xbox to play games over your broadband connection.

As mentioned previously, every Xbox has a unique XCID assigned to it. When a user logs into Live!, the online servers check the legitimacy of the console's operating system and will detect unlocked (decrypted) hard drives as well as any modifications to the operating system onboard the hard drive. It was originally intended that this system would allow remote patching and improvements to automatically be installed, however an additional function is to detect the presence of modded systems. If a modified system is detected, the XCID is immediately banned from Live!, forever barring the console from online play. In this way, only users with legitimate copies of software running from the optical drive can participate on Live! As Microsoft controls the Live! system, and can change and update it as it sees fit, it is impossible to circumvent or hijack online game play for very long.

Although at present, modified consoles can play on Live! with the mod chip disabled, sources within Microsoft have hinted that it is possible for the Live! system to detect if the console has been modified regardless (especially if the console has a newly-fitted hard drive). It would seem that Microsoft is employing a 'fair use' policy; if you want to play Live!, buy the game and run it (and don't fiddle around with the contents of your console, or stick things inside it)!

In all, the Xbox is a much more moddable system than the PS2, especially with the ease of its 'core processor' being a member of the venerable x86 family. It is amazing that a little bit of silicon, a few copper strands and a lick of solder can convert a games console into a true entertainment streaming system or an efficient, neat-looking Linux server.

Mod chips are an interesting piece of technology and testament to the ingenuity of the mod community and its dedication to push the boundaries and capabilities of hardware. These chips have also managed to spark debate not only in the legality of the technology, but also the ethics behind region coding.

The author would like to thank GameFix for making this feature possible.

head to head

Supercomputers

James Wang compares the biggest toys of all. 'Biggest' does them no justice.

When it comes to 'Maximum Power Computing' – the mantra of *Atomic* – nothing compares to the supercomputer. At one point existing only in the world of vector processors and monolithic mainframes, supercomputers are now built using clusters of top-of-the-line PC components and popping up in every business, government and educational institution. This fascinating industry features the most diverse hardware, exotic applications and stupendous computational power.

To see how it all fits together and where we go from there, turn your brain to high-gear and read on.

The ASCI program

In 1992, a landmark bill was passed by the US government that effectively terminated its nuclear weapons testing program. This gave birth to the Accelerated Strategic Computing Initiative (ASCI), undoubtedly the most ambitious supercomputing project in history. It envisioned the construction of a series of supercomputers, the last of which would deliver 100 teraflops of computing power to simulate a full scale, three-dimensional thermonuclear detonation. Taking advantage of cheap off-the-shelf components, every big name in the hardware business was contracted to take part in the project.

Intel delivered the first model called ASCI Red in 1996, using over 9,000 Pentium Pro CPUs. IBM delivered ASCI Blue in 1998 alongside ASCI 'Blue Mountain' from SGI in the same year. For much of the decade, the ASCI program kept the US as the undisputed leader in the supercomputing field. Then in 2002, Japan unveiled a not so humbly named 'Earth Simulator' facility. Making use of NEC's latest SX-6 vector CPU, the performance went as high as 36 teraflops, demolishing the latest ASCI model, the HP/Compaq ASCI Q by almost threefold. Needless to say, this caused a firestorm of controversy in the United States and reinvigorated debate as to how supercomputers should be built.

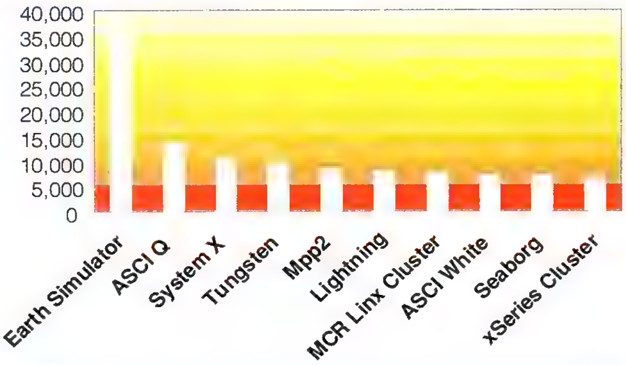
To understand why supercomputers are built, you need to be aware of the two types of 'problems' they are likely to encounter. The first type is data-centric, requiring the same few instructions to be executed on an enormous data set. The lack of dependency lends this type of problem to SIMD (Single Instruction Multiple Data) and vector operations. Because of the large dataset and relatively simple computation, such problems are mostly I/O bound.

Typical examples include automobile design and weather forecasting. The other type is instruction-centric, requiring many operations to be conducted for each piece of data. This can often be so complex that multiple cycles are needed before the final value is computed. Such problems are computation bound and are less critical on bandwidth.

Graphics shaders fall into this category since each pixel takes multiple cycles of work, sometimes requiring over thousands of instructions to be computed for each pixel.

Vector processors

Vector CPUs are the most parallel processors you're ever likely to find. They are designed to deal with the first type of problems, data crunching. A vector is simply a one dimensional array or a group of scalar quantities. For example, a single Pringles chip is scalar, but put 50 in a can and they form a vector. Whereas our humble PCs more or less work on scalars in a serial fashion, vector processors are designed to consume entire vectors at a time.



Category:	Typical PC	Earth Simulator	Human Brain*
CPU	Pentium 4 3.06GHz	Vector CPU 500MHz	100 giga-neurons
FLOPS	3.06 gigaflops	40 teraflops	0.1 to 10 petaflops
RAM	1GB	10TB	Short-term memory
Storage capacity	120GB	1.6PB	10 - 100TB
Interconnect	125MB/s	6.1GB/s	1GB/s visual input
Power consumption	200W	20kW/node	23.3W
Size	Fits on desk	Fits in four tennis courts	Fits in bucket
Cost	$2,000	US$350 million	Priceless

How processing power is measured

Of the two data types in computing, integer (whole numbers) and floating point (decimal), the ability to compute the latter has become the goal of both desktops and supercomputers. This is because most interesting forms of computation such as media, graphics and physics all require data of floating point precision.

Supercomputing performance is measured in floating point operations per second, or FLOPS. A CPU with one floating point unit can perform FLOPS equal to its frequency. A 3GHz Pentium 4 for example does 3 gigaflops (SSE usage can double this). CPUs with multiple floating point units achieve direct multiples of their clock speed in floating point performance.

Linpack is the benchmark used to measure and rank the performance of supercomputers in the top 500 list (www.top500.org). This is based on solving very dense systems of linear equations. All calculations are in 64-bit floating point and done using add and multiply instructions. However, according to the Cray spokesperson we contacted, Linpack is misleading as it only measures the speed of processors and not the entire system. Despite this, it is still widely recognised as a key measure of supercomputing performance.

*** These numbers are a collection of commonly quoted statistics. There is no agreed scientific measure of human brain capacity; these numbers only serve as an intuitive reference.**

Vector processors commonly have eight vector units, each with its own floating point unit. One cycle in this case can produce eight times the floating point output of an equivalent scalar processor. Because of the streaming nature of the data (it's worked once and never accessed again) most vector processors dispose of data caching all together. They do however pack special vector registers that are designed for fast computation.

The most important aspect in achieving peak performance in vector machines is making sure all types of code can be packed into workable vectors. This can be done via explicit programming techniques, special compiler optimisation or both. It's worthy noting that vector CPUs powered the first supercomputers (Cray 1) and continue to power the current world number one. However, due to their cost, vector computers are now a rare breed, with the NEC SX-6 and Cray X-1 being recent examples.

John has two motherboards. One breaks because the heatsink on it weighed 780 grams, and another crashed so much, it met its end with a Glasgow kiss. How cool is John?

Post-RISC processors

Post-RISC processors can be broadly divided into those serving the desktop market and those made for servers. The Pentium 4 and Athlon represent the first category while IBM's Power/PowerPC series, HP's PA-RISC and Alpha series as well as Sun's Ultra Spark series are examples of the second. The server processors tend to run proprietary instruction sets, operating systems and software in order to best make use of their power.

The main difference between the two types of CPUs is sustained performance, 64-bit addressing and scalability. Although always clocked lower than the fastest desktop CPUs, having multiple execution units allow more work to be done in one cycle. These server CPUs are also loaded with three levels of cache and fatter pipes to main memory, providing superior bandwidth compared to the desktop counterparts. Another key difference is software. Whereas the server solutions run custom enterprise software, PCs run Windows and Quake. As a result, both function very poorly at the other's job (most servers don't even have an AGP slot).

Scalability – the essence of supercomputing

The interesting part of supercomputers aren't their individual CPUs, powerful as they may be. How supercomputers perform will be highly dependent on how they are linked and how memory is shared. Ultimately, the scalability of a system will determine its overall power. We'll first look at the scalability of the number of CPUs for each node (a single tower or cabinet) and from there see how well the nodes scale to form supercomputers.

Consider the scalability of the Pentium 4 Xeon as used in the world's fourth fastest supercomputer. With each added processor, the theoretical processing power is doubled while the available bandwidth is halved. This greatly limits the effective scalability of Pentium 4 systems on the board level. The IBM Power4 and AMD Opteron on the other hand incorporate a dedicated memory controller on the CPU. In this case, adding an additional processor also adds a memory controller, allowing the new CPU dedicated access to memory without contention. For this reason, the majority of Pentium 4-based clusters come with two processors per node while server class CPUs do much better.

The Power4 based p690, the jewel in the crown of IBM's UNIX server range is one brilliant example of such multi-tier scalability. Each processor in the Power4 contains two floating point units. Each unit can compute a fused multiply-add in one clock cycle. This allows four floating point operations to be done in one clock. But the Power4 chip doesn't stop there. It has two processors per chip, with a shared L2 cache and chip-to-chip communication logic. Fully fed, this tops the floating point capability to eight per cycle. Where this architecture really gets interesting is the use of a special ceramic 'multi-chip-module' or MCM, which allows four Power4 chips to be connected on a single package. A full IBM p690 series server can be armed with eight of these MCM packages, effectively creating a 32-way SMP node. Incidentally, of the world's top 30 supercomputers, seven are based on IBM's p690.

Although all unique and worthy of discussion, it's impossible to look at every server-class CPU and its scalability options. The overall picture is that most desktop-based nodes have two CPUs running in SMP due to memory bandwidth limitations. Server-class CPUs often have two processors on a single chip and multiple chips per package, each with very wide and often dedicated buses to feed the processors. This allows higher scalability within the chassis and hence more processing power per node.

Coding parallel

While scalability in a single node is nice, it's not how supercomputers achieve their earth-simulating power. Today's top 500 supercomputers, be it vector or RISC-based, will all be the result of clustering – multiple nodes linked together to solve a common problem.

To have an appreciation for the difficulty of this matter, one needs to realise that the applications we run on PC don't run well on supercomputers. This is because programs from Microsoft Word to Unreal Tournament were written in a programming language that translates to a single thread of instructions. Because this thread of instructions has dependencies, one can not break the stream into multiple threads and have supercomputers run them concurrently. In order to use supercomputers, all problems, data or instruction-centric, must be written so that they can be broken down to have minimal dependencies and maximal parallelism.

Depending on how memory is organised in the supercomputer, there are a few ways of doing this. Under the distributed memory model, where each node has its own addressable memory, MPI (Message Passing Interface) and PVM (Parallel Virtual Machine) are the two de facto standards which allow programs to be written to exploit multi-node systems. Under the shared memory model, where the supercomputer treats the memory in all its machines as one big addressable block, the OpenMP language is commonly used. Typically a system will use OpenMP to program at the node level as memory is often shared within the node, and uses MPI to allow messages to be passed across the network where memory in other nodes can be accessed.

The weakest link in supercomputer systems are in their interconnects. Any improvement here will almost guarantee proportional increase in performance, especially for I/O bound problems. To provide the best node-to-node connection, most I/O intensive clusters have turned to Infiniband and Myrinet, both of which provide very high bandwidth and low latency network connections. Vector supercomputers like the Cray X-1 can crunch enormous data sets and hence require even more bandwidth for its nodes. As there are no commercial systems to provide this kind of throughput, Cray designed its own interconnects. 'To give you some idea how fast it is, the effective (subtracting overhead) internode network bandwidth of Myrinet 2000 is 228MB/s. The new IBM HPS switch ('Federation') is 707MB/s. Infiniband 4X is at 850 MB/s. The NEC SX-6 IXS custom interconnect (found on the Earth Simulator supercomputer) is a far-faster 6,100 MB/s, and the Cray X1 interconnect is at 11,776 MB/s,' an unnamed Cray spokesperson explained.

> 'A supercomputer is a device which converts a computation bound problem into an I/O bound problem.' – Seymour Cray

Earth simulation, not nuke simulation

Whereas the US decided to commit to building supercomputers when it no longer could test its nukes, the Japanese had a different cause, as Nobuo Shimakura, who works for Japan Marine Science & Technology Centre explained to us: 'Development of the ES started in 1997 with the aim of making a comprehensive understanding of the global environmental changes that were discussed in Kyoto Conference (COP3) held in 1997.' Because Japan's geography is composed of a series of narrow

Long neck and no hands, 100 legs yet I cannot stand. Born of forest nest, against a wall I rest. What am I?

islands and coastal cities, it is especially vulnerable to changes in ocean conditions. To accurately simulate atmospheric and oceanic circulation, it was decided that the supercomputer must be able to resolve the world down to 10 square kilometres. The specification called for at least 10TB of main memory and enough computational power to crunch the enormous data set. This type of problem was both massive in problem size and highly dependent, resulting in the selection of the SX-6 series of vector supercomputers that were available from NEC.

The ES facility is three stories high and about the size of four tennis courts. To protect the facility from earthquakes, the middle floor which hosts the 640 nodes that make up the Earth Simulator is architecturally suspended from the rest of the building. The blue housing cabinets are each marked with a red circular disk, eerily reminiscent of the HAL9000 killer computer. Each node is fitted with eight 500MHz vector processors and 16GB of shared main memory, achieving a theoretical peak of 64 gigaflops. The nodes are connected via a single stage crossbar configuration, offering 16GB/s of cross section bandwidth.

In terms of raw performance, the 640 nodes, with eight chips each and eight vector units per chip, sets a world record of over 40 teraflops, blazing through the countless atmospheric particles it needs to simulate. When asked about the future and whether it's in Japan's interest to remain world number one, Shimakura had this to say: 'From the viewpoint of the execution of the actual application program, ES can stand for the top in the world for the next four or five years. We have, however, already started to investigate the next-generation simulator based on the new architecture, although the financial support is not clear as of now.'

The new taste supercomputer: Big Mac

To contrast against the big, expensive and propriety nature of vector supercomputers is the Apple G5-based, 'System X' at Virginia Tech, rightly dubbed 'Big Mac'.

The design principle of System X is in every sense the antithesis of the Earth Simulator; instead of using expensive custom components, System X is built from the hottest off-the-shelf components. Currently ranked at world number three, it is a true wonder given that it's made with the direct opposite philosophy.

The project took form in early 2003 when Virginia Tech decided to build a world-class supercomputer using 64-bit technology for its students and researchers. Because the university was part of the National Lambda Rail Network, an enormous optic fibre pipeline, it was envisaged that the supercomputer would be connected to other supercomputing facilities across the US and allow on-demand sharing of resources.

At the time, Dell offered an Itanium 2 cluster, while AMD and IBM offered Opteron-based systems. The price range for all proposals sat around $10 million – not horrible but far from ideal. Come June, Apple announced the much anticipated G5 and the rest is history. 'For a 64-bit platform, there was (and is) no other less expensive solution for the type of capability compute resource we wanted to build.'

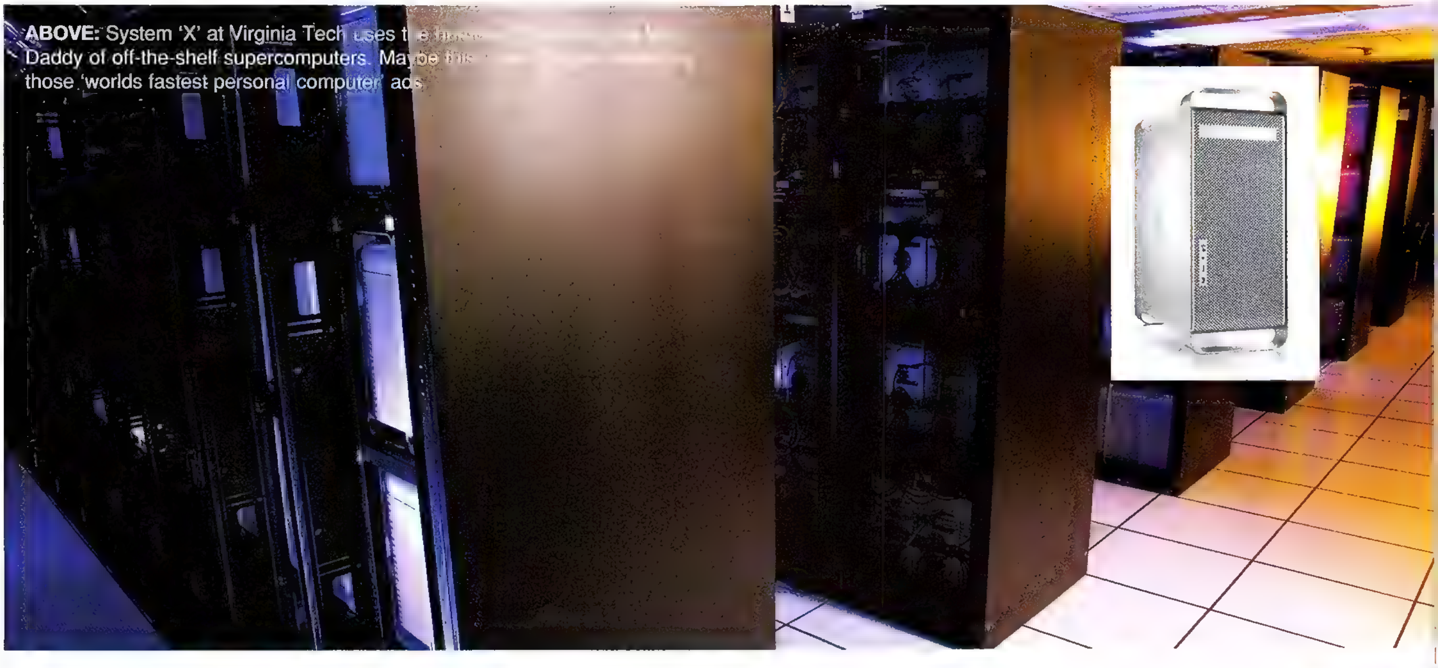
'We looked at every vendor and every processor along the way to selecting the G5. Nothing could beat it in the 64-bit world,' Jason Lockhart, a researcher at Virginia Tech told us.

The G5 is powered by dual PowerPC970 CPUs, which are derived from the IBM Power4 chip.

It shares the same double floating point unit but is clocked higher at 2GHz. This produces 8 gigaflops for one CPU, a theoretical peak that equates to the vector processor found in the Earth Simulator. (Although the ES CPU has four times the floating point units, its clock speed is four times lower).

In order to have adequate bandwidth between nodes, Inifiband 4X was used to connect the machines, which has a peak performance of 1.25GB/s in full duplex. The memory of the nodes was programmed under the distributed memory model using the Message Passing Interface. With all 1,100 towers in operation, the theoretical performance maxes out at 17.6 teraflops, beaten by only two other machines, the Earth Simulator and ASCI Q facility at the Los Alamos National Laboratory.

The final cost? A mere $5.2 million – a tiny fraction of the $350 million monster that is Earth Simulator. Given that much to spend, we'd rather buy seventy 'Big Macs'.



ABOVE: System 'X' at Virginia Tech uses the [illegible] Daddy of off-the-shelf supercomputers. Maybe this [illegible] those 'worlds fastest personal computer' ads

Upcoming supercomputers

The 2005 deadline for the ASCI program requires the completion of the ASCI Purple – a 100-teraflop supercomputer from IBM. IBM is also working on a new type of supercomputer named BlueGene/L, which has been designed specifically to investigate protein folding. The initial prototype is already complete and currently stands as the 73rd-fastest supercomputer. The final model is aiming for 1000 teraflops, or a petaflop.

In 2005/6, we'll also see Sony's PlayStation 3, which in all likelihood will be hyped as a supercomputer. It draws inspiration from IBM's 'Deep Blue' supercomputer that defeated world chess champion Garry Kasparov in 1997. Based on grid computing and a new way of distributing parallel workload based on software 'cells', the console's final computational power is projected at around a teraflop.

ABOVE: An artist's impression of IBM's Blue Gene/L Supercomputer, which is scheduled to be installed in the Lawrence Livermore National Laboratory in 2005.

The future soon

The future of supercomputing won't be the revival of closely coupled vector processors. Nor will it be domain of cheap, commodity clusters. Serving different roles, both will continue to exist, much like how server-class CPUs have always lived alongside cheaper desktop processors. The really exciting change that will transpire, and is currently in the works, is the virtualisation of computational resources. If that made no sense, take a deep breath and consider the modern electricity or water grids.

None of us have nuclear power generators in our backyard. None of us have to visit a well to collect water. This is because these resources have evolved into mere utilities, centrally distributed and paid for on a per-unit basis. Computational power on the other hand is purchased and upgraded as new applications impose greater demand. The main reason why this model has resulted is due to the lack of robust connections between machines. With enough bandwidth and the right network topology, a new model may very well be around the corner.

If you observed that parallelism is the key to building supercomputers, it takes merely one more step to realise that when multiple supercomputers are linked, one creates a new class of computing monster that defies classification. This is possible thanks to grid computing, which is based on a set of open standards that allow the sharing of heterogenous computing resources. That is to say, different CPUs running different operating systems over arbitrary geographical locations can run the same grid interface and seamlessly share computing power.

Around the world today, grid computing is transforming from a marketing slogan to a physical reality. Ultra-high bandwidth connections are joining supercomputers together to form large computing grids. In the United States a working implementation is already in place. Named 'Teragrid', this network has already linked more than three supercomputing facilities together and by the end of this year is set to reach 20 teraflops thanks to the combined power of five facilities. In Japan, the National Research Grid Initiative is seeking to link over 100 supercomputers across the country through the 10GB/s SINET network. Applications from protein folding to nano-engineering are literally waiting to be unleashed on these supercomputing grids. European efforts of similar scale are also underway. Once all connected, the internet or 'internet 2' by that time, will be to supercomputers what electrical grids are to appliances.

If the grid phenomenon was only occurring in the scientific field, then it would not be worthy of much excitement. 'Grid' is starting to emerge as a serious model of on-demand computing for corporations. But even that is awfully mundane. Here's the big one: grid computing is the heart of the PlayStation 3 architecture and Sony is betting its entire home network strategy on the core concepts of grid computing.

Once realised, the PS3 will serve as a provider of computing power for all connected devices. But this is a huge topic and will serve well for another in-depth discussion in the future.

From the alpha to the omega

First we had the computer. It stood alone, providing its own computing power, but the information stored was like a stale pond of water. Then the network gave birth to data sharing and the rivers of ones and zeros began to flow. All of sudden, a computer was no longer self-contained. The internet expanded this to every computer, creating an always-on information network. Will grid be the next evolutionary step? Will it bridge the gap between PCs and supercomputers and form one ubiquitous computing network?

When this day comes, then we'll all be free, and 'Maximum Power Computing' will be for everyone to experience.

How far will a blind dog walk into a forest?

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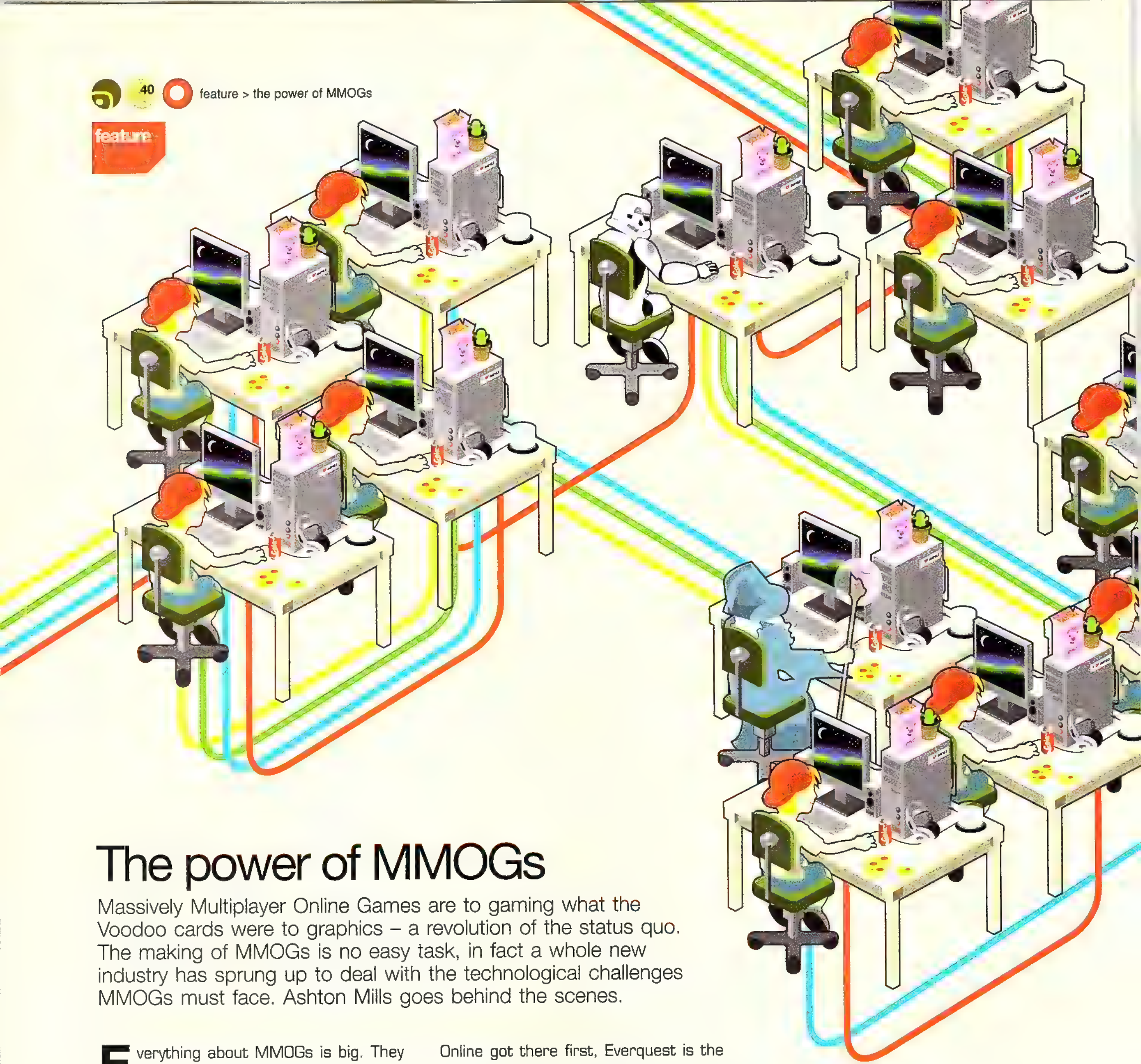


The power of MMOGs

Massively Multiplayer Online Games are to gaming what the Voodoo cards were to graphics – a revolution of the status quo. The making of MMOGs is no easy task, in fact a whole new industry has sprung up to deal with the technological challenges MMOGs must face. Ashton Mills goes behind the scenes.

Everything about MMOGs is big. They cost big money to fund, they use big numbers of machines, take advantage of the world's biggest network, and have player bases so big they put small cities to shame. But most importantly of all, they are big business. Massive, in fact.

It hasn't escaped the attention of industry players such as Microsoft and Sony Online Entertainment that MMOGs are where it's at, now and in the future. Games such as the Dark Age of Camelot series, Everquest I and II, Planetside, Star Wars Galaxies, Anarchy Online, EVE, World of Warcraft, Second Life and more are testament to just how big MMOGs have become.

Just how big is big? Korea, one of the world's most connected countries, has four million people subscribed to its home grown MMOG 'Lineage' – that's a fifth of the population of Australia, all playing one online game. Even though technically Ultima Online got there first, Everquest is the most recognised MMOG in the western world, and In the five years that it's been running it's accrued a subscriber base of 420,000 players whose total playing time, Sony Online Entertainment is proud to proclaim, is equivalent to 184,000 years. Now you know why it's affectionately called Evercrack.

Over the years Everquest servers have transmitted some 10 trillion kilobytes of data, or 10 billion megabytes (stick that in your (bandwidth) cap and smoke it!) Got a big broadband bill? Not really, considering just how profitable the game has become – it's sold 2.5 million copies and reaps some US$60 million dollars a year through its subscribed players. Globally, the MMOG industry is expected to be worth US$3.2 billion by 2006.

Compared to traditional gaming models, MMOGs are an entirely different beast. It takes massive amounts of money, resources, time, and technology to bring a MMOG from concept to creation – indeed, because the volume of work required for the underlying systems alone is so, well, *massive*, a number of companies have appeared whose core product is third-party MMOG middleware – the tools and services required to construct, manage and maintain MMOG infrastructures – thereby slicing years off development and allowing game developers to get on with the game of developing.

Three such companies are Zona Inc (www.zona.net), Butterfly.net (www.butterfly.net), and Australia's own Bigworld (www.bigworldtech.com). These guys are at the forefront of MMOG development, but as we don't have the space to cover all three and Bigworld sits in our own backyard, we'll focus on Bigworld here.

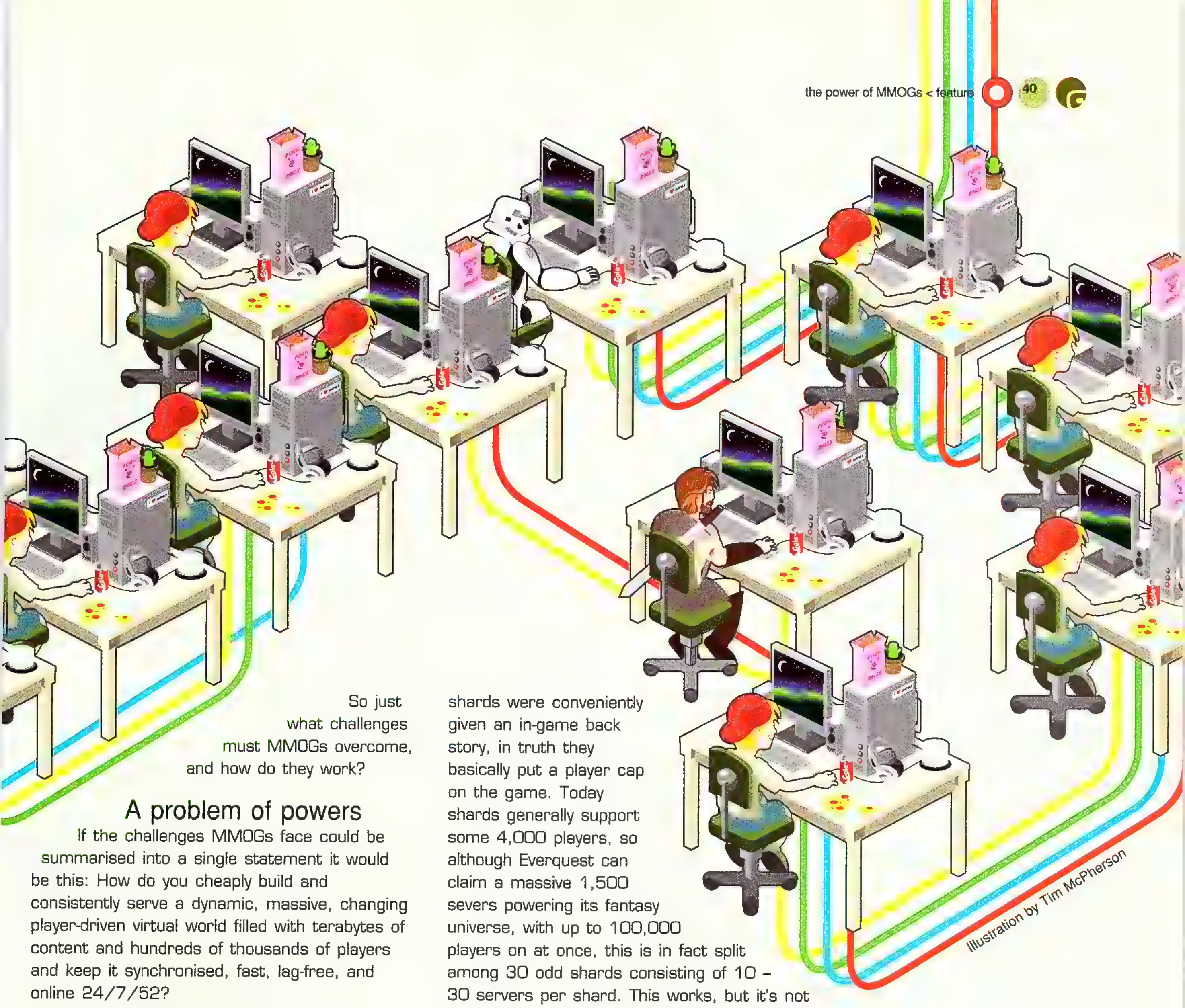


Illustration by Tim McPherson

So just what challenges must MMOGs overcome, and how do they work?

A problem of powers

If the challenges MMOGs face could be summarised into a single statement it would be this: How do you cheaply build and consistently serve a dynamic, massive, changing player-driven virtual world filled with terabytes of content and hundreds of thousands of players and keep it synchronised, fast, lag-free, and online 24/7/52?

Yeah, it's not a small problem. Before you even begin to deal with servers and networks there are four key hurdles to jump, unique among game development, that MMOGs need to overcome. And the greatest of these is scalability.

Simon Hayes, Chief Technology Officer of Bigworld, calls it the "n-squared" problem and it works something like this:

Standard multiplayer games such as Half Life or Battlefield synchronise the game state for all players by sending the actions of one player to every other player in the game. For the 16 – 64 player games we see today this is quite alright, a single machine can easily handle the workload. But as you increase the player number you start running into an obstacle – with each player added to the game both the processing and bandwidth requirements scale exponentially, literally equal to the number of players squared (n). The moment you start dealing with hundreds of players, you have quite a problem.

Everquest tackled this by dividing the player load between a number of identical server cluster virtual worlds called 'shards'. While shards were conveniently given an in-game back story, in truth they basically put a player cap on the game. Today shards generally support some 4,000 players, so although Everquest can claim a massive 1,500 severs powering its fantasy universe, with up to 100,000 players on at once, this is in fact split among 30 odd shards consisting of 10 – 30 servers per shard. This works, but it's not ideal – friends on different shards are unable to communicate or play with each other, shards that end up under-populated can become a money sink, and most importantly of all the player limit of a few thousand players is big, but not massive by any measure. And at least with Everquest's implementation of load balancing the zoning (which causes pausing as players move between regions in game) sucks the hot dog big-time.

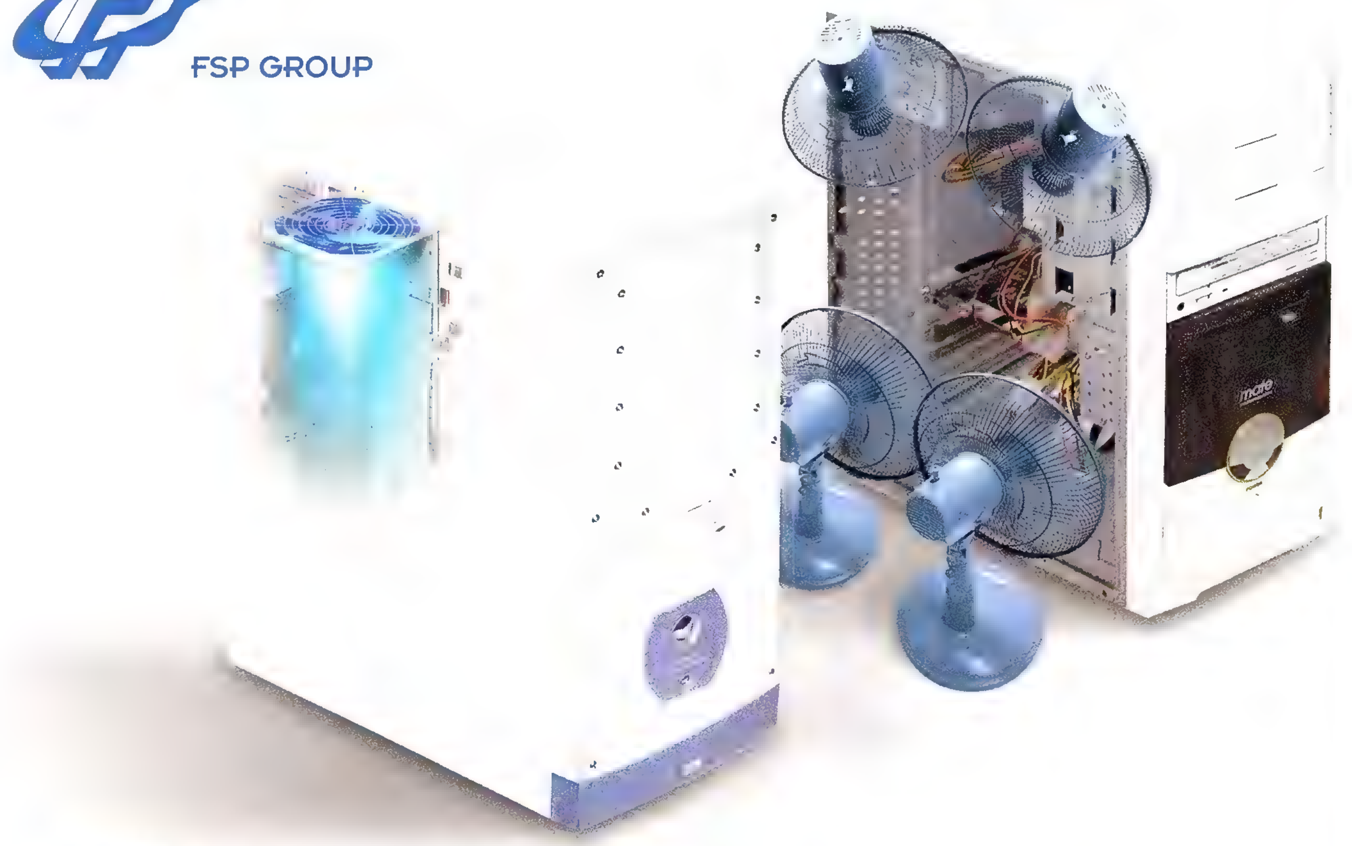
To be fair Everquest pioneered the genre and had to deal with a lot of first-time issues that others have now learned from – downtimes, hacking, cheating, lawsuits over performance, server limitations, social exploits, and the eBay fiasco to name but a few. These pains were inevitable and, most importantly, they lit a path of challenges future MMOGs would need to solve.

Which brings us to the question: how do the MMOGs being built today solve the problem of scalability?

Zona.inc breaks the infrastructure into multiple server tiers, with each tier dedicated to a particular task including the core game servers, sphere servers (load balancers), dispatching servers (allocation), and miscellaneous servers for chat, game world data, and back-end databases. Zona.inc's solution only supports up to 32,000 players, but is focused at the console market such as PS/2 and XBOX gaming.

Butterfly.net takes a leaf from grid computing – a technology allowing disparate machines in a network mesh, with or without centralised controlling nodes, to perform as a single computational engine. In addition, dedicated servers handle tasks such as NPC or AI and grid management. The very nature of grid computing means the power of the grid can be expanded just by adding more machines. Buttefly.net currently has eight studios signed up and developing with their architecture.

FSP GROUP



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Bigworld's solution is also a distributed computing infrastructure much like Butterfly.net, but puts almost all processing tasks onto the grid itself, creating a truly scalable solution. Bigworld has signed four studios so far and received high praise from Microsoft for their work (whether any of Microsoft's current MMOGs use Bigworld Hayes couldn't say).

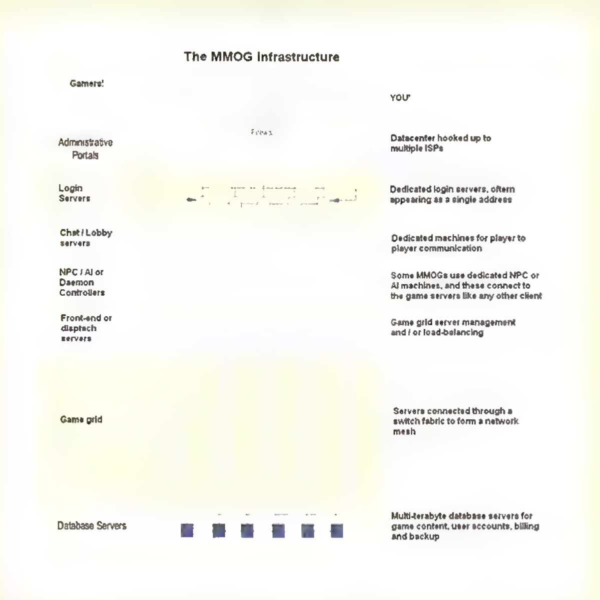
Cell structure

Bigworld tackles the issue of scalability by splitting the game world up into unique cells, each of which is managed by a single machine in the network. Rather than being of fixed size, the area these cells cover in the game world can be dynamically resized depending on load – if an event is happening in a cell, and hundreds or thousands of players are descending on it, the server can dynamically shrink the area that it manages to ensure it doesn't become overloaded, with neighboring cells expanding to take up the slack. The shape of the cells is polygonal, so the dynamic nature of the resizing cells is quite versatile.

Additionally each server in the system can dynamically adjust the volume of data they process by reducing the level of detail they send out to all the players within the cell. Hayes gives the example of how you don't really need to know about a player five hundred metres away jumping up and down, but if that player were to shoot you with a projectile weapon, then that's something your client *does* need to know about. Between dynamically resizing the area managed by the cell and increasing or reducing level of detail sent to players, the grid can adapt to and process data optimally and ensure a smooth game is had regardless of load.

The system has one other significant advantage – it means there is no limit on the size of the world and, with this, no player limit either. Bigger worlds and higher player numbers or densities can be supported simply by adding more machines to the grid. This is the true MMOG capable of – at least theoretically as it hasn't actually been tested yet – supporting millions of players in a single, seamless, world.

In fact, as an Intel white paper on grid technology observes, this is the *only* way truly massive online worlds can be developed.


The MMOG Infrastructure
Gamers!
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Dedicated login servers, oftem appearing as a single address
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Dedicated machines for player to player communication
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Some MMOGs use dedicated NPC or AI machines, and these connect to the game servers like any other client
Front-end or disptach servers
Game grid server management and / or load-balancing
Game grid
Servers connected through a switch fabric to form a network mesh
Database Servers
Multi-terabyte database servers for game content, user accounts, billing and backup

The MMOG infrastructure

What happens when you connect to your beloved MMOG?

Clients first connect to any number of login servers through a firewall which, thanks to a gateway, often appear as a single address. From here your account details are retrieved and validated from back-end database servers, along with your billing details, because they ain't going to let you play unless you pay.

Your character details are then loaded from game databases and your client is re-directed, via one of the load-balancing, dispatch or proxy servers to a game world server in the grid and you become one of the synchronised entities of the game world – your appearance and actions are sent to the client of other nearby players, and vice versa. From here on your client talks directly to the game world servers, mediated by the dispatch or proxy servers. As you change locations in the game world, the game server your client talks to changes as well. Of course, done right, this is something you never notice.

Reasonably reliable

The second most important hurdle MMOGs must overcome is the issue of reliability. You've got a large collection of servers up 365 days a year for many years at a time, it's unrealistic to think that it's going to run like clockwork. Hardware will die, security breaches will happen, and bugs will need to be patched. How are you going to offer a consistent, reliable, service?

The grid system, as already explained, is naturally fault tolerant – if a machine goes down, the cell it was managing is passed off and shared among its neighbor cells. But there's more to reliability than just the servers.

Core to the issue of reliability is the consistency of the world's game state. Player data needs to be backed up frequently, such as every hour (less Z3rO_COol loses his 'Orb Of Extreme 1337ness' he just found after a once in a millennia fight), which over thousands of players (and in the future, millions) could impact gameplay. More than this, how do you ensure that as and when hardware failures occur that players in the downed cells don't lose vital information?

Bigworld has an innovative solution here: the data representing a player is divided up into a 'base' and a 'real'. The base consists of data such as the player's inventory, personal statistics, money and so on, and during play is stored and processed on what Bigworld calls 'proxy' or 'front-end' servers connected to the grid. The real part of the player consists of data such as their health, their geometric location in the world, and other variable states. The real is the entity that walks the cells.

From this they create a number of 'ghosts' – duplicates of the real, like a mirror image – one for each adjacent cell. First and foremost this allows, for example, two characters which exist on different cells to interact. In this situation, each player actually interacts with the ghost of the other player that exists within their cell. Data is then piped from the ghost in one cell to the real on the adjacent and vise versa. And here's the nifty bit – when a player crosses cells, or if a cell should fail, a player's 'real' is simply switched to a ghost in the next cell, and the player continues unawares.

All entities in the Bigworld game world are time stamped and processed in a similar way to CVS. Any changes to game state data, such as a bugfix or new content, are automatically propagated and synchronised among all servers and clients. As Hayes puts it – they can literally change the properties of a monster while it's attacking you, if they wanted to. Aside from being the perfect patch distribution system this gives an amazing level of control over the game world and allows, for example, Game Masters to dynamically generate stories and adventures on the fly without needing to restart the world.

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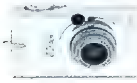

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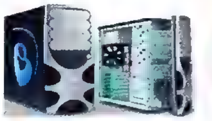

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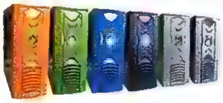

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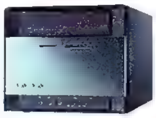

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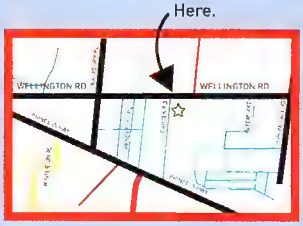

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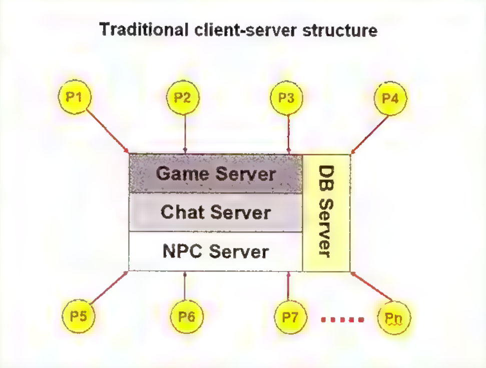
Navigating the network

The third hurdle of MMOG building is the infrastructure of the network. Zona.inc put it best with 'Your game platform is the network, not the device'. And here, interestingly, the biggest concern isn't volume, but speed.



ABOVE: Like the name says, this is a traditional client-server structure. MMOGs need to do extraordinary things to make this simple premise work on a larger scale.

If the network is the body of the MMOG, then the lifeblood is the network protocol stack. TCP, while nicely fault tolerant, is rather pedantic about the flow of packets – it insists packets remain in a given order, and when a packet goes missing will buffer incoming packets until the missed packet is re-sent and received. Naturally in gaming waiting on data before being able to proceed is out of the question if you want any measure of responsiveness.

UDP, by comparison, is rather basic. It doesn't care about order, and if a packet goes missing it doesn't notice. It's great for shoveling data fast in an environment where a missed packet isn't essential – which is why FPS games always use UDP. But the problem with this however is that for inter-process communication between machines in a cluster or grid, the reliability TCP offers is actually valuable. So what do you do when you want the best of both worlds? You write your own networking layer!

So it was that Bigworld developed a layer to sit on UDP they call Mercury which adds features such as ordering, piggybacking ACKs on the back of packets, and most importantly of all adding CORBA-like abilities to allow game state data to be communicated among machines. In English this means allowing the software to operate as if the network wasn't there at all. For example, when player A hits player B and a damage function is called, the game engine doesn't have to be aware that player B exists on another server. The combination of UDP and Mercury allows fast *and* reliable inter-process communication among servers and clients.

Everyone's a hacker

If there's one thing the internet has taught us it's that nothing is secure. This, the fourth hurdle, isn't a problem unique to MMOGs of course – hacking is a huge problem in all FPS games – but the impact on MMOGs is far more serious. Cheating and abuse can impact hundreds of players in a game, and if this makes the game less enjoyable they may leave and take their subscriptions with them. It's vital, from a financial standpoint, to ensure the game remains as fair as possible.

Given the assumption that nothing is hack-proof the best place to start is to assume that, inherently, all data streaming in from clients is untrustworthy. Hackers *will* reverse engineer the communication streams and create programs to alter the game state data leaving their machines.

So from the ground up the MMOG engine needs to be designed with security in mind – encrypted streams if the overhead isn't too much, verifying critical incoming data, serialised packets to make them harder to spoof, and limiting the functions the client has access to. For example, while a client might be able to call a function like 'weapon attack', only the server should be able to call a function like 'decrement health'. If the client can't call it, it can't abuse it.

Good auditing tools are essential as well to ensure that, as much as possible, any hacking is detected or at the very least traceable. Most importantly of all, it's vital to only send to the client what it needs to know – one of the first hacks for Everquest was an enemy health display that wasn't normally visible, made possible because Everquest was unnecessarily sending the health status of monsters to clients along with everything else.

Naturally when these faults occur it's vital to take action, such as blacklisting a cheating player or releasing a patch to update the game world. The continued success of the MMOG relies upon the provision of a fair and feasible game world. If that breaks, the player base will too and the MMOG could lose its bread and butter.

World building

Above and beyond these challenges MMOG developers also have to face creating gigabytes of content to populate their virtual worlds, nurturing gamer communities, installing a support infrastructure, setting up and running beta programmes, and finding ways to serve up new content and game play to keep gamers interested. The development of MMOGs is, like their virtual words, an ongoing adventure.

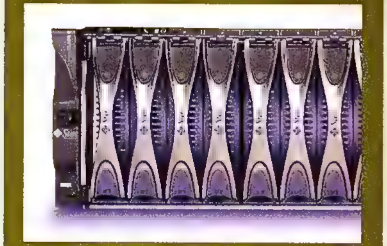
And as usual, gaming pushes the boundaries of technology and innovation. The MMOG developers of the day are quite literally pioneering the computational and communication technologies that will power the future of entrainment. To quote Intel in a case study of the business of MMOGs – 'To say this is a growth industry is stating the obvious. It's like saying the Pacific Ocean is big.'

Big? *Massive.*

Sweet dreams are made of these

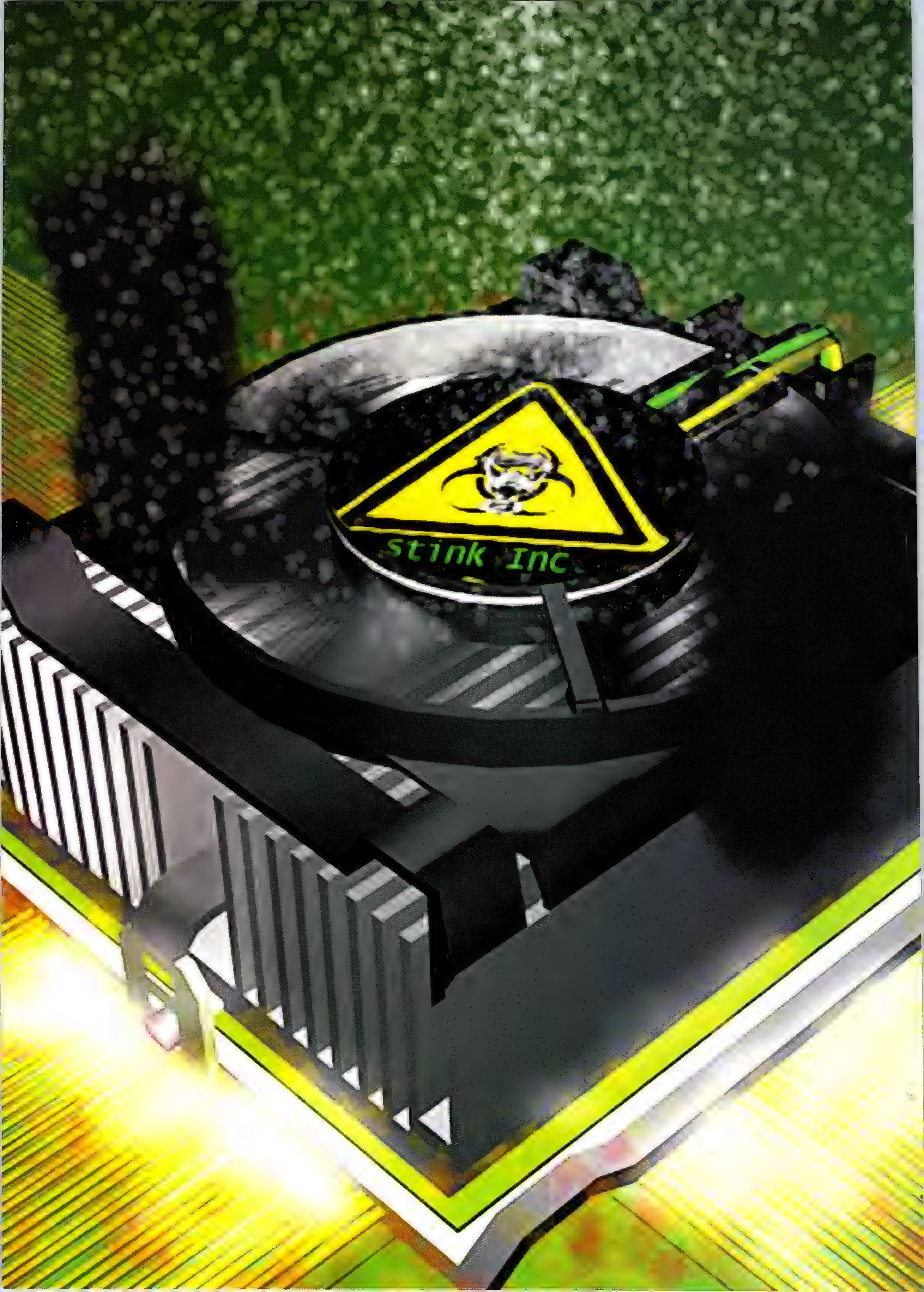
What about the machines, what sort of beefy babes are MMOGs powered by? 'All makes and models' says Adam Joffe, chief technical officer of Sony Online Entertainment. There is no standard configuration, however all machines generally need at least 1GB of RAM to handle their duties, something Simon Hayes, CTO of Bigworld, agrees with.

And operating system? The de-facto standard seems to be Linux, not just because of its stability and performance but simply because – considering the sheer number of machines MMOGs use – there are no license fees. While Zona.inc, Butterfly.net and Bigworld have no qualms about advertising the use of Linux, Joffe was guarded over the operating systems SOE use to power games like Everquest, Planetside, and Star Wars Galaxies, saying simply 'we don't rely on just one operating system'.



ABOVE: A 16-CPU SUN Blade – some MMOGs are made of these. Easy expandability = problem-free growth.

Hayes notes that for grid-based systems it's more cost effective to use off-the-shelf-gear rather than expensive high-end servers. Even if it's more prone to failure, the self-healing nature of the network means it's easy to replace with little impact on the game.


stink inc.

Reviews

The nerve to speak silently

Inadvertently, Nathan Davis verbalises his apple.

NASA has been stewing up some tasty hot tech lately and they're at it again. You know how in the future no one talks with their mouths and vehicles are a thing of the past, with teleportation and all that jazz? Well, one of those things has come to light. We can barely understand quantum entanglement enough to teleport light photons, let alone entire atoms and the tech for recomposition of matter and intact objects, so sorry, it isn't teleportation. I'm not sorry. Cue the eggs.

As I vaguely mentioned, the future, which we've seen in many wild sci-fi flicks is finally making a break for the reality vista. A primary function of human communication – speech – in all its regular form of pure primitiveness, blows space fairies. At least that's what a bunch of crazy lab rats at NASA thought. Full agreeance here.

Something urged them to discover the ability for humans to talk in a far superior manner. A manner which doesn't require any effort at all – essentially speech without the mouth, or sound for that matter. I swear they've sat through one too many LOTR marathons.

They've gone and uncapped us a mad new world – sensing the nerve activity in the throat and under the chin so as to translate them to the words they represent via software. You see, when silently reading or talking, the human brain still sends sub-auditory speech data to the nerves in the throat. It just never makes it past this area. It's about time we learn to use these wasted signals.

The software, only recently developed, originally understood several command words and numbers zero through nine. Using a numbered matrix chart of the alphabet, they managed to submit 'NASA' to a search engine then further customise the results. As a scientist said, this is 'proof' they can browse the internet without a keyboard.

I have some more proof – browsing the internet with simply a mouse would be faster than using said matrix – copying letters and pasting them one after the other. No keyboard either.

This will take time to mature and properly recognise letters/words, and has a long way to go before it's implemented into everyday life activities – but when it finally is, life will be so much sweeter.

Hopefully there will be some form of context sensitive AI built in, or homonyms would be a problem, or isles would become bustling shopping lanes. I'd like to see something else built into this system which would resolve this problem. Why not a complete interface package – *with* the typo-correcting steak knives?

Perhaps this same monitoring of the nerves can be applied to moving things around on the screen by simply imagining it – with sensors sitting on instead of in our heads. I can see this working as a matter of a simple brain wave calibration. Seeing as all humans think differently, this calibration could first check out and observe your standard brain waves, gathering a blueprint of your 'idle' waves, so as to filter them out. It would then ask the user to physically move a mouse or type on a keyboard and monitor the brain wave activity while doing so, then have the person imagine the same thing. This has already been done with monkeys and leads dug into their heads, just not humans yet. It does work, but anyone care to try?

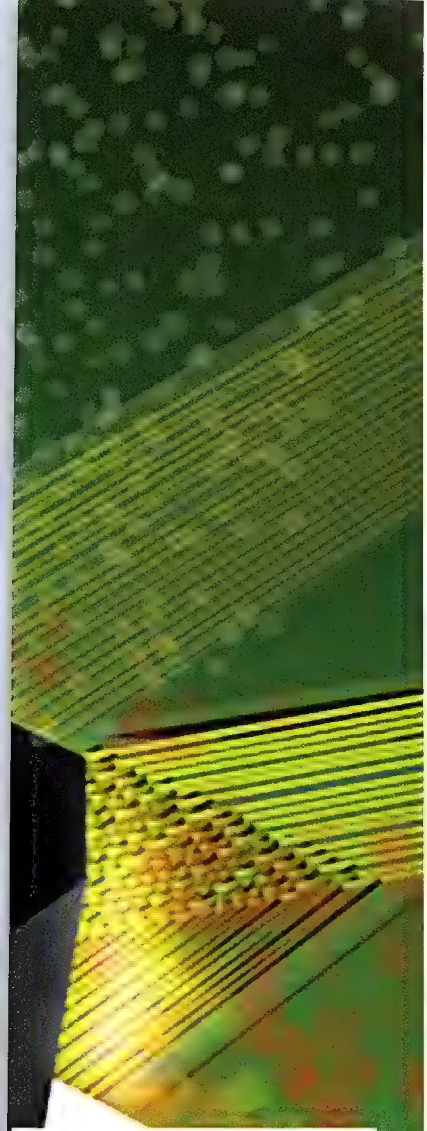
This would fix the problem of incorrect word recognition, as we could then have an internal keyboard system (we will never escape the damned keyboard). Seeing as many people can already type without actively 'thinking' about it, every letter or word would have a particular brain signal or signature as such being sent to the fingers. It'd just be a matter of capturing and calibrating that data, too.

Now, if we can link all this up with a technology to feed audio directly to our inner ears, we'll be set for some seriously crazy stuff. Like, not knowing whether or not you're talking to yourself.

Agent Smith didn't see that coming. Neo: 'Meh, keep the mouth.'

Ciao, 'til next time.

amesnews.arc.nasa.gov/releases/2004/subvocal/subvocal.html



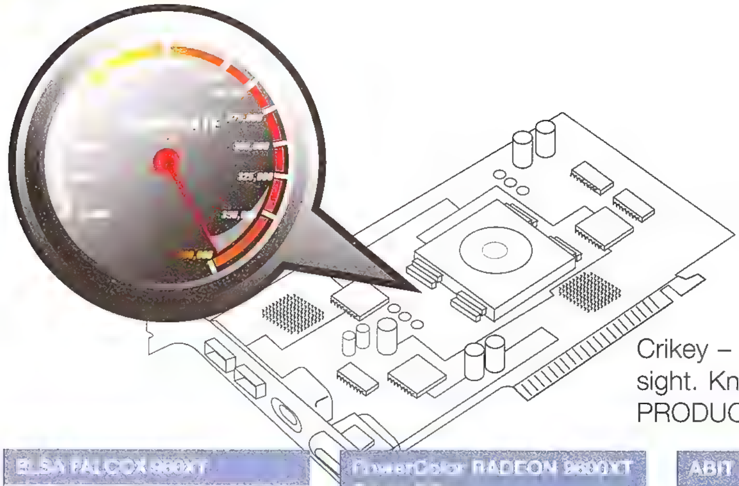
discreet
combustion

artomic

'Burn' by Mr Stink

This image was made in memory of my old PIII who melted an honourable death at the cause of overclocking. It took me four hours on Christmas eve with 3DS Max, I then added the white hot tracks with Paintshop Pro. I toyed with the idea of sticking the *Atomic* logo on the centre of that fan to increase my chances of winning something, but decided it would probably just score cheap points. Enjoy.

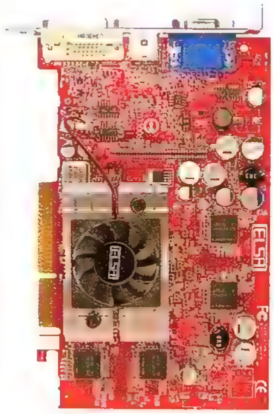
Create the winning *Art*omic and win the latest version of combustion, valued at $1,995, from discreet. Email a preview (no larger than 5MB) of your games or hardware-themed masterpiece to artomic@atomicmpc.com.au.



Framerate

Crikey – a horde of ATI cards and not a single 9800XT in sight. Know what else? WE'RE SICK OF UPPERCASE PRODUCT NAMES!

ELSA FALCOX 9600XT



Specifications: ATI RADEON 9600XT; 128MB 128-bit DDR RAM; 400MHz dual RAMDACs.
Core speed: 500MHz
Memory speed: 600MHz
Price: $295
Supplier: Altech
www.altech.com.au

ELSA is totally new to the Australian arena, having been in the Europe and Asia market for some time. In the past, it was Europe's primary source of Quadro cards and it has kept this legacy with its consumer cards. Compared with other manufacturers, ELSA focuses on quality, pushing out cards with only the best components, such as BGA memory. The memory frequency is slower, but if other ELSA cards are to go by, it's ready for some decent overclocking. A good card, but nothing overly exciting.

ELSA
www.elsa.com.tw

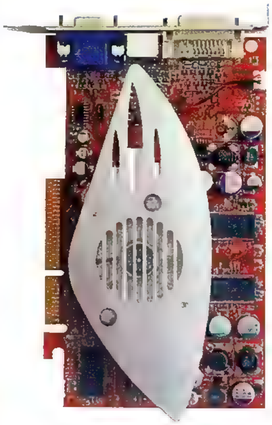
PowerColor RADEON 9600XT Bravo 2.5ns

Specifications: ATI RADEON 9600XT; 128MB 128-bit DDR RAM; 400MHz dual RAMDACs.
Core speed: 500MHz
Memory speed: 680MHz
Price: $286
Supplier: Australia IT
www.australiait.com.au

As you may know, the PowerColor 9600XT card we checked out in *issue 38*'s Framerate did not in fact have 2.5ns memory, rather a set of 2.8ns chips. This one however does have 2.5ns BGA modules. For your reference, the writing on the Samsung modules should read 'E-GC25' for 2.5ns instead of 'E-GC2A', which signifies 2.8ns. At stock speed, this card performs exactly the same as 2.8ns, however, at 2.5ns, the memory's top frequency should be around 800MHz.

PowerColor
www.powercolor.com.tw

ABIT RADEON R9600

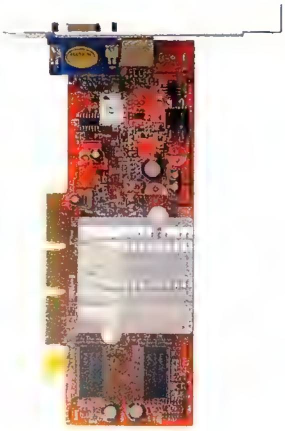


Specifications: ATI RADEON 9600; 256MB 128-bit DDR RAM; 400MHz dual RAMDACs.
Core speed: 325MHz
Memory speed: 400MHz
Price: $231
Supplier: Altech
www.altech.com.au

The 9600 is an older core than the 9600XT, but it's still manufactured on a 0.13-micron process. The 9600 definitely doesn't perform as fast as the 9600XT, but it *is* cheaper. This card is for those after a cool and quiet, low end card for a home theatre PC, yet want a tad more 3D power than a 9200 (though way more expensive). Also equipped with VIVO, apart from the weirdly flat heatsink, it's a decent balance of low temperature and price. So feel free to pick one up if need be.

ABIT
www.abit.com.tw

ABIT RADEON R9200SE-T

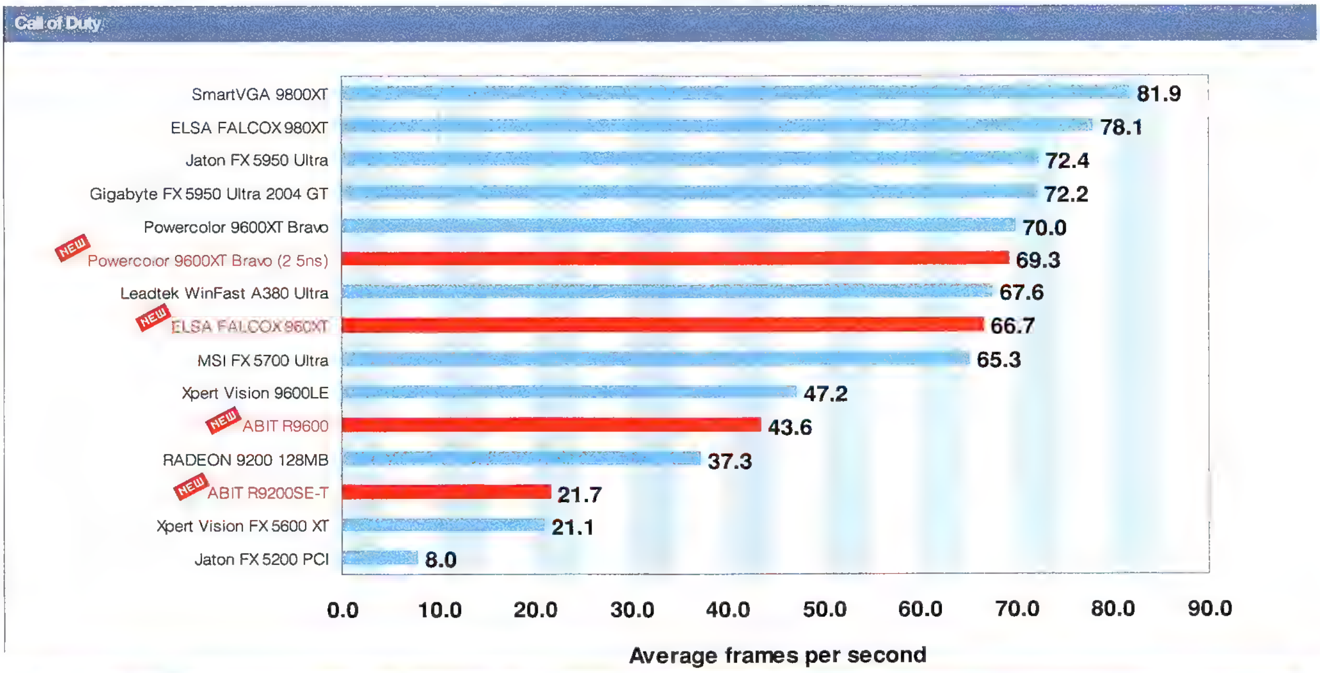


Specifications: ATI RADEON 9200SE; 64MB 64-bit DDR RAM; 400MHz dual RAMDACs.
Core speed: 200MHz
Memory speed: 400MHz
Price: $90
Supplier: Altech
www.altech.com.au

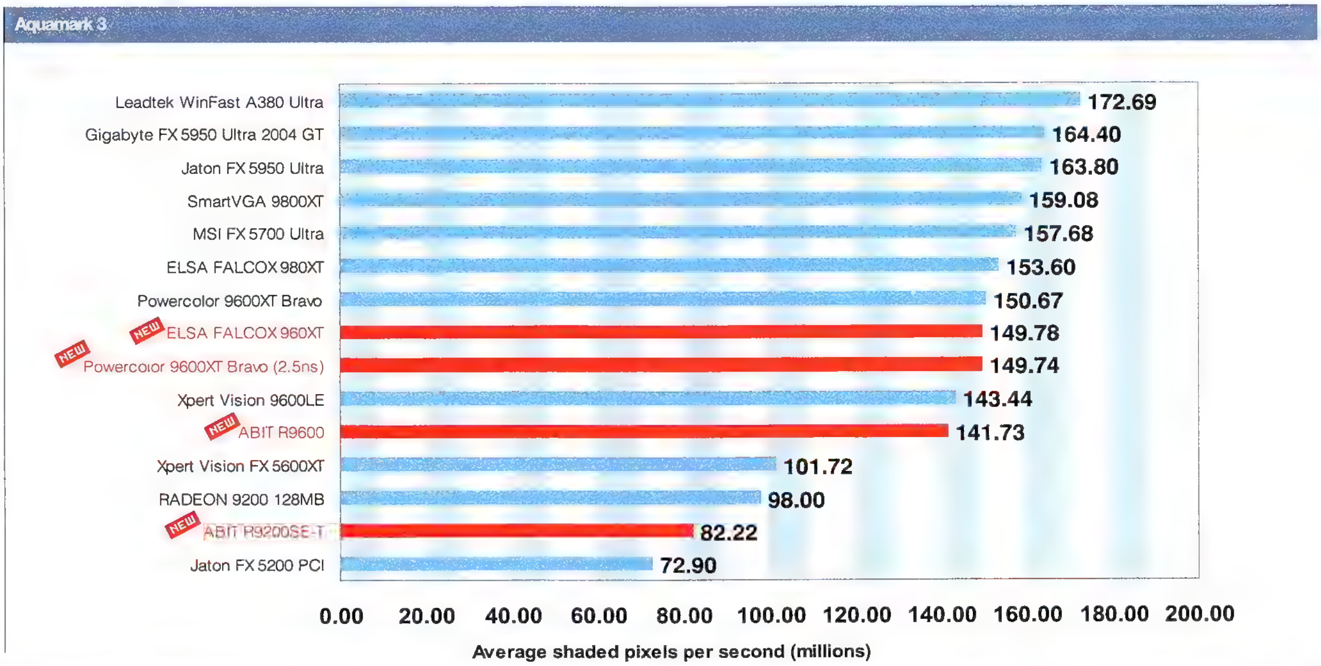
At $90, there's no beating the R9200SE-T in the home theatre market. That's just dirt money for a new core that's 110% silent and pulsating with plenty of power to do the usual theatre-required tasks. To keep the costs low, the card is strapped with four 16MB TSOP modules. Like the ABIT card we checked out a few issues back, on contact, the heatsink still brands the ABIT logo onto your biggest organ (and thus loud). Heat is the major concern, which may be a problem for passively cooled boxes.

ABIT
www.abit.com.tw

Call of Duty



Aquamark 3



Video cards

It's that happy time of the graphics card cycle for us performance nuts as the new generation of chips are unleashed in a hail of rhetoric. By the time you read this, the carefully guarded secrets of the NV40 and R420/423 will have been revealed, though we suspect actual cards will be months away. To get the lowdown on these cards, *Atomic* is hitting the road in April for briefings on both NVIDIA and ATI's offerings. So look out for our extensive coverage of these beastly cores in *issue 41*.

As for the all important question of performance, all we can say at the moment is that the *Atomic* Spy Ring is hearing whispers from Taiwan that the era of one manufacturer having a significant performance lead over the other may be ending.

To tide you over, we suggest that you head over to Microsoft's XNA website (www.microsoft.com/xna) and watch the demo videos. It isn't clearly outlined on the page, but these were rendered on a next generation ATI chip.

CPUs

While 'regime change' was the buzzphrase of 2003, 'socket change' is all the rage in 2004 as both Intel and AMD are set to debut new CPU sockets. Intel is set to move from the now well established Socket 478 to the bizzaro world of pinless CPUs and pin-laden socketry that is LGA 775. While it is being very tightlipped about timing, this change should happen when Intel launches its long awaited Grantsdale and Alderwood chipsets.

We hoped that AMD may have debuted its new Socket 939 with its new Athlon 64 FX-53 CPU, but sadly it uses Socket 940 and the registered DDR memory that goes along with it.

While we haven't been able to nail down dates (the time measurement type, not the dinner and a movie kind), we suspect that this will happen around the start of June. For this is when the annual component launchfest that is Computex is set to kick off in sunny Taipei (sunny as in the climate, not the Bollywood actor).

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Billion takes ADSL broadband to a new, sophisticated peak with elegant trimmings to ensure the smoothest Internet experience ever.

apc
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FEB 2004

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- 802.11g wireless access point with Nitro™ speed mode for enhanced performance in mixed-speed 802.11b/g environments, supporting both WEP & WPA encryption
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QoS: The secret to keeping your Internet connection fast and responsive

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  www.warcom.com.au
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  www.hyperbyte.com.au

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  www.cormain.biz
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  www.i-tech.com.au
- **ARC Computers** Tel: 02 97488322
  www.arc.com.au

QLD:
- **OZ Technologies** Tel: 07 3205 5005
  www.oztechnologies.com

WA:
- **W.A DATA Pty Ltd.** Tel: 08 9249-3622
  www.wadata.com.au

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Global WIN Silent Stream

Supplier:
COM-TEK
www.com-tek.com.au

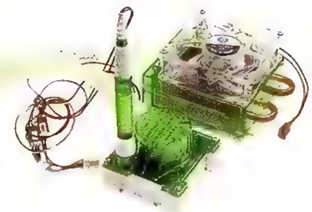
Website:
COM-TEK
www.com-tek.com.au

Phone:
COM-TEK
(03) 9329 2388

Price:
$179

Specifications:

Water cooling unit for Socket 478/A/940; copper radiator with 80mm fan; aluminium cooling block with copper core; pre-filled cooling solution.



Strange note to start off on, but this thing has a ghastly manual. It's a nasty read and even though there are tonnes of photos for every step, the snaps were taken from peculiar angles and tend to hide areas of interest. Like which way the cooling block seats.

Screw the damned manual – it was far easier to install without it and fairly straight forward if you've ever had anything to do with installing a heatsink.

There's no need to fill this with liquid, as that's already been done – according to the manual, the mixture is 30 percent antifreeze fluid and 70 percent standard H2O.

Assembly was three hells of a nasty time, though just for the Intel side. You see, a neat clip was made so that the AMD chips are easy to install, but for Intel CPUs, side brackets had to be screwed on both sides of the cooling block.

Fair enough, but the holes could have been made just a tad larger, or at least pre-threaded. As it stands, a marriage of 10x muscle, 1x pliers and 1x screwdriver is a requirement to properly attach them.

We suggest you don't use the radiator as your primary exhaust fan, as suggested in the bloody manual. Reasons such as 'collecting up all the heat from your box' and 'you stupid dumbarse' should explain pretty much everything.

If you don't have a hole on the side of your case, either make one or set the radiator up outside of your case if you are after any kind of cooling.

In the Lab's cool ambient temperature of 24°C, we popped it on Chernobyl with our P4 adapter and churned up the heat to the regular 80W – it produced a highly disappointing 48°C.

That's just shit.

For a 'Silent Stream' it sure is a noisy blighter, edging on CPU HSF volumes. Alas, both the fan and the water pump run on ball bearings. The Gigabyte 3D Cooler Pro (Hot award, *issue 38*) is far quieter at the slowest speed (silent even) – and as it turns out, the same temperature in a warmer room. Madness.

Overall, it's the most mediocre water cooler we've looked at to date. If you can appreciate that in some bizarre form (because mediocrity rocks your world), go and grab one.

Otherwise, grab a watery solution that *works*. ND

SCORE **1/10**

Thermaltake Extreme Giant III

Supplier:
Anyware
www.anyware.com.au

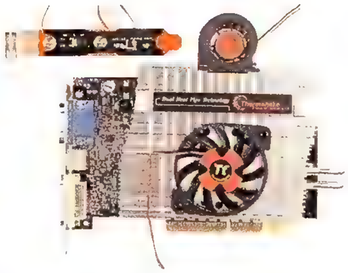
Website:
Thermaltake
www.thermaltake.com.au

Phone:
Anyware
(02) 9879 5788

Price:
$60

Specifications:

Aluminium VGA card cooler for NVIDIA and ATI cards; PCI slot fan controller; 60 x 60 x 10mm fan; 40 x 40 x 40mm 'Turbo blower' fan; supports variable speeds (3,000, 4,200 and 5,300rpm); eight TSOP all-copper RAMsinks.



Thermaltake's Extreme Giant III is the Robocop of VGA cooling kits. Bets are that, if this sucker had been around in 1987, Peter Weller would have been fighting Carl Elwes for a role in *The Princess Bride*. It's really that mean-looking.

Robocop references aside, the Giant III is a beast. The package comes with a bunch of screws (spares included), eight copper RAMsinks, a PCI slot fan controller and a two-part heatsink. There's also heatpipes, a generous tube of thermal compound and two fans, all which would lead one to believe that the Giant III is a cooling monster. And a monster it is.

Unit assembly requires, at a minimum, three hands with six fingers apiece. It's kind of the case with all massive video coolers, as parts need to be secured to both the top and bottom of the card and not all units are forgiving in the 'gravity does it's own thing' department. The Giant III is especially ruthless. It also happens to be the single *tallest* video cooler we've come across.

Pulling out the same Sapphire 9600XT we used to test the VGA Silencer in *issue 39*, the Giant III was put through its paces.

It was tested in the following configurations, each while coping with a 10-minute run of 3DMark2001 on our custom 'thrash' mode: main fan on low, on medium and on high; main fan on high with turbo blower and main fan on low with turbo blower. Ambient temperature was 25°C.

For its size, the Giant III was underwhelming. Although it's slowest setting averaged 36.1°C, on-par with the Silencer, the medium setting was forgettable at 34°C, and the highest setting disappointing at 34°C also. With the addition of the annoyingly-loud Turbo blower, the Giant III managed a 33.6°C average. The difference was greater with the main fan on its lowest setting and the Turbo blower on, where there was a 3°C change (44°C – 47°C).

Despite these results, Thermaltake's Extreme Giant III is well constructed and some 10°C cooler, on average, than the stock heatsink. Unfortunately, the price tag of $60 is a little daunting, considering a 20-odd dollar solution like the VGA Silencer, or a $30 passive Zalman unit, provides better, quieter performance for less. LB

SCORE **6.5/10**

To think a theory never thought, to talk a tale never wrought, to walk a trail never worn, to live a life never born. Where? ○

ASUS P4R800-V Deluxe

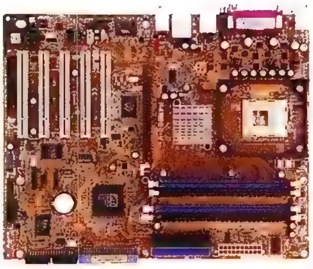
Supplier:
ASUS
www.asus.com.au

Website:
ASUS
www.asus.com.au

Phone:
N/A

Price:
$190

Specifications:
ATI RADEON 9100 IGP; Gigabit LAN; SiS180 SATA RAID with two connectors; three Parallel ATA connectors; six-channel audio; IEEE1394; S-Video TV-out onboard.



So far the RADEON 9100 IGP has been confined to micro-ATX motherboards and pitched as an OEM solution rather than one for end users. From our talks with motherboard manufacturers, this has largely been due to some USB related bugs in the A43 revision of ATI's IXP150 Southbridge (as outlined in our news piece on *page 11*). Now that ATI has released the A44 revision of the IXP150, full sized RADEON 9100 IGP motherboards will start appearing.

The first of these boards to hit the *Atomic* Labs is the ASUS P4R800-V Deluxe. This board sports a lot more features than the micro-ATX boards we have seen and positions the RADEON 9100 IGP as a real competitor to Intel's 865 and 875.

While the chipset can keep up with Intel's offering in the performance stakes, and is significantly faster in the integrated graphics department than the i865G, the IXP150 Southbridge is not quite as robust a solution as Intel's ICH5R.

This is especially evident in the support of SATA devices, as ASUS has had to use a SiS180 SATA RAID controller to compensate for the lack of native SATA support in the IXP150.

Unfortunately we were unable to get Windows XP to detect the SiS180 controller during installation using the current BIOS and drivers. This means that it was impossible to install Windows onto a SATA drive, which diminishes the usefulness of the board, especially when compared to the seamless SATA support in Intel's chipset.

Apart from this issue the ASUS P4R800-V is a tasty offering, especially considering the power of the integrated graphics, and the inclusion of an S-Video connector on the backplane of the board itself. While ASUS manages to get around the limitations of ATI's IXP150 Southbridge by liberally sprinkling the board with third party controller chips for not only SATA but Gigabit Ethernet, six-channel audio and IEEE1394.

Rather than a competent OEM solution like the motherboards we have had a look at in the past, with the P4R-800-V Deluxe you have a board that extends the functionality of the ATI RADEON 9100 IGP wonderfully. If only the SATA controller worked a wee bit better, this could be a kickarse piece of hardware. JG

SCORE **8/10**

Shuttle XPC Zen

Supplier:
SATO Technology
www.satotech.com.au

Website:
Shuttle
www.shuttle.com

Phone:
SATO Technology
(02) 9748 2999

Price:
$480

Specifications:
ATI RADEON 9100 IGP; one 5.25in and two 3.25in drives bays; external 180W PSU; one PCI slot; CMOS reset button on rear.

Silence is golden. And just like gold, the value of silent computing ebbs and flows. Only three years ago a howling FOP38 7,200rpm fan was an acceptable solution for a lot of (now tinnitis-afflicted) people, but these days the overall noise levels of PCs are dropping. There are many products that call themselves silent; with varying degrees of success, but Shuttle's XPC Zen (ST62K) is perhaps the quietest system to ever pass through the *Atomic* Labs.

Designed for the mass consumer and home media network use, this is a departure from Shuttle's normal chassis design. It uses an external 180W power supply brick to reduce size and noise.

The power connects to the back of the XPC, hooking into a custom plug on the motherboard and then routed back out from the board to the drives. This is a work of engineering art, requiring some major trickery from Shuttle's engineers, as motherboards were never meant to be power distributors on a large scale.

To save space the Zen also lacks an AGP slot, but this is mitigated by the use of ATI's RADEON 9100 IGP for graphics.

There are two fans inside the Zen – a small chipset fan and the usual 80mm rear venting fan used on the ICE cooling system. While the chipset fan is near silent, the rear fan is capable of pumping out some serious noise when running at maximum speed. Which in two weeks of running the unit in a Sydney summer happened only during the obligatory loud few seconds of the bootup phase. For the rest of the time, the only noise emanating from the Zen comes from the optical and hard drives installed. It was so quiet that we kept assuming it was turned off.

In fact our only complaint about the Zen is that the blue LED on the front is a little too bright, especially in a darkened living room.

This is not the basis for a gaming box; it fits very much into the home media network or 'need a computer to do email' category. But it is small, silent and incredibly well featured. JG

hotaward

SCORE **9.5/10**

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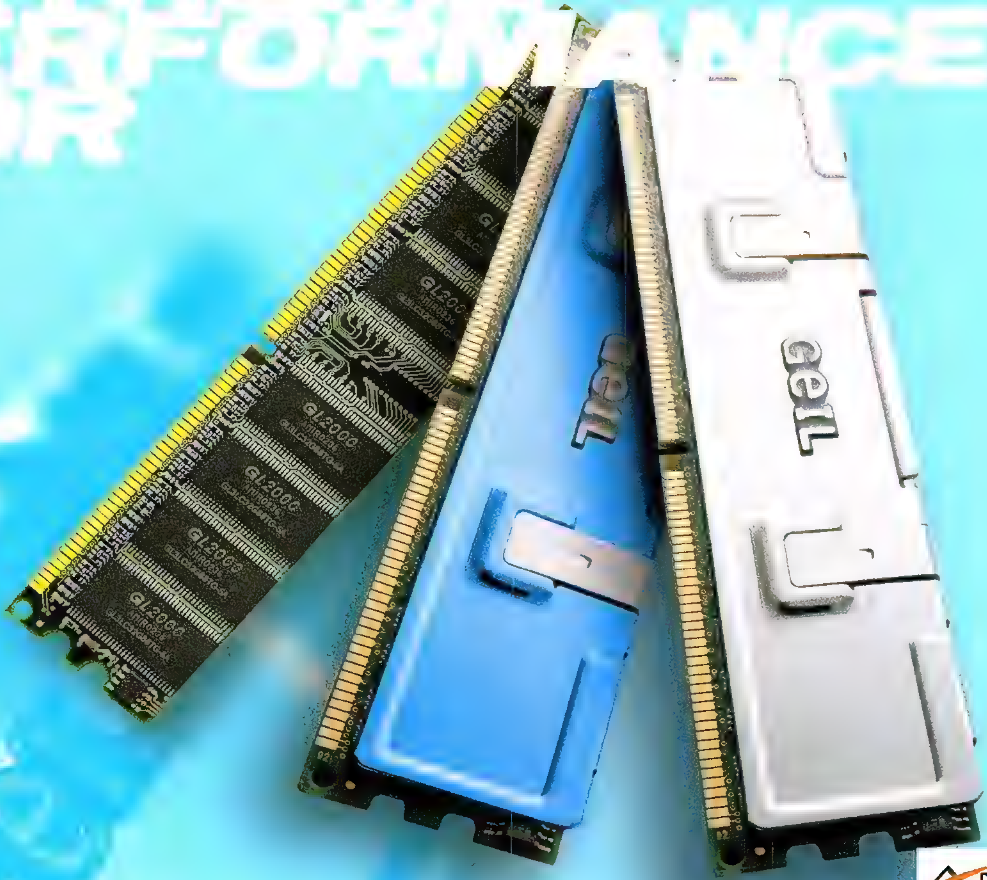
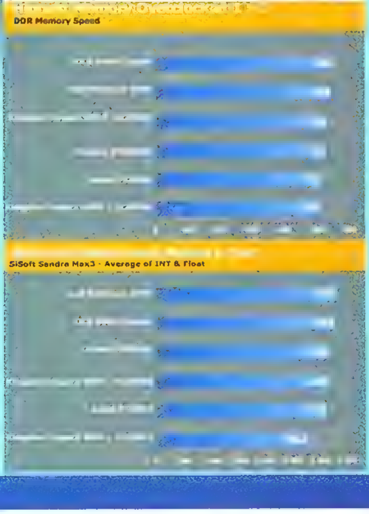
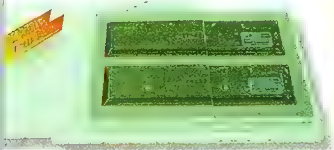




C4200
33MHZ
DR

Platinum Series

4000 500Mhz / PC4200 533Mhz Dual Channel Ultra Platinum Kit



- Hand Picked GeIL 3.5ns Chips
- 6 Layers Ultra Low Noises Shielded PCB board.
- 30 micro-inches of gold on the pins
- Optimized SPD for Dual Channel DDR motherboards.
- Tin Coated Platinum - Copper Heat Spreader
- 2.65V-2.95V
- CAS 2.5 7-4-4 Running @ DDR500MHz PC4000
- CAS 3 8-4-4 Running @ DDR533MHz PC4200
- Lifetime Warranty

PC3500 433Mhz / PC3700 466Mhz Golden Dragon Dual Channel Kit

- Hand Picked GeIL 4.5ns Chips
- 6 Layers Ultra Low Noise Golden PCB board
- 30 micro-inches of gold on the pins
- WLCSP Memory features GeIL tradmark on the wafer
- Optimized SPD for Dual Channel DDR motherboards
- 2.65V-2.95V
- CAS 2 6-3-3 1T Running @ DDR433MHz PC3500
- CAS 2.5 7-3-3 2T Running @ DDR466MHz PC3700
- Lifetime Warranty

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www.geilusa.com

Dell Inspiron 9100

Nathan Davis takes this notepad for a stroll. Around his desk.

Supplier:
Dell
www.dell.com.au

Website:
Dell
www.dell.com.au

Phone:
Dell
1800 335 524

Price:
$3,999

Specifications:
Intel Pentium 4 3.2C; 2GB DDR400; 128MB Mobility RADEON 9700; 15.4in Wide UXGA (1,920 x 1,200); 60GB 5400rpm HDD; NEC DVD+RW ND-5100A drive; 802.11g; 10/100 Ethernet; Bluetooth; IR; FireWire.

The Inspiron 9100 is Dell's latest desktop replacement, or as Dell call it a 'High-Performance, Multi-Media Powerhouse'. In other words, the notebook that's continually changing the rules relating to size. Oh, and wads of power. Look at some of the Centrino-powered laptops (more like arm-tops) – they're small, yet often underpowered; now look at this and you might be forgiven for thinking it's an oddly shaped Cisco rack server. Weighing in at about 4.1kg, it was actually lighter than we expected. Just bulky, phat and loaded with features.

Let's not kid around though, 4.1kg *is* bloody heavy, but a wonderful monster it is, with its highly impressive range of features. As a desktop replacement, Dell has opted for the tried and true 865PE desktop chipset. Likewise, the model we specially hand-picked is seated with the feisty 3.2C P4 CPU (full 800MHz FSB, baby), 2GB of DDR-400 RAM (dual channel), 60GB HDD (5,400rpm – you can opt for 7,200rpm but naturally this will increase heat), 802.11g wireless adaptor, Bluetooth hub, Infrared port, removable DVD+RW combo drive, FireWire – it also has DVI, D-Sub S-video and composite outputs. Some serious kit, especially if you take a peak at the price – just sit down in a carpeted room first.

Coupled with a 450MHz/550MHz 128MB Mobility 9700 (which is essentially a Mobility 9600 with low-K dielectrics that enable higher clock speeds), it actually sprays totally playable frame rates. And in new games such as CoD and Unreal Tournament 2003 (modified for full 1,920 x 1,200 glory) with maxed-out settings. We found it didn't want to play nice with antialiasing. Like, 8x antialiasing. We found that it totally slaughtered the frames and actually had the machine freezing up, surprisingly reliably.

As it uses a desktop processor, it doesn't come equipped with any whiz-bang speed reduction technology to reduce power usage so the default battery life is somewhat lacking. If you do cut off the juice supply, it will stay on for about an hour or so, depending on how you use it.

It tends to heat up when in full use, but with three internal exhaust fans, it manages to dissipate the heat reasonably well for this desktop processor.

When Dell first showed it to us, they were somewhat keen in demonstrating the sound. It has four tweeters (2W/two speakers per channel) and a 5W subwoofer. The idea was there, but unfortunately it's poorly executed.

The treble is piss weak and the subwoofer is barely audible in most situations – however, for good reason. You see, there have been known difficulties with other manufacturers having to limit the thumping power of the subwoofer because of problems with thundering the poor HDD, leading to slow performance when playing beefy audio.

Naturally we had to test this, as the bass is reasonable for a notebook, but lame nevertheless. In PCMark04, we tested the hard drive test suit both with and without some solid Rock. Even with this weak subwoofer, the original HDD score of 3,694 sharply lunged down to 2,525, simply from the playing music. Because of this, it's unlikely notebook speakers will start sounding fantastic all too soon. Just stick with headphones.

The results were impressive and pissed right over any alternative. This thing is a grunting work horse. In Call of Duty it managed to spurt out 56.6fps at 1,280 x 1,024 and just over 143 million shaded pixels per second in AquaMark3. In desktop terms, that's mid-budget line for gaming, but certainly not for a desktop replacement – maximum remarkable points right there.

Another sweet feature is the screen – an orgasmic 15.4in UXGA wide screen. The extra width and fine detail it can display are pure brilliance. With a physical count of 1,920 x 1,200 pixels at a very delicious 0.18mm dot pitch, it's close to better than real life.

Naturally, resolutions such as 1,600 x 1,200 have their sides chopped clean off on either side. Unfortunate, but if wide-screens are going to be out of proportion, they might as well be made full use of. The 0.18mm dot pitch certainly does it justice, with barely visible pixels, allowing, for example, serious precision in games and for the desktop hordes among us, fit more icons on your desktop than you ever thought possible. Sadly, the screen's update time is only rated at a maximum rise of 20ms (with a max fall of 30ms), but it's still quite capable of playing games. And it does have outputs. . .

This completely drowns other notebooks available with whipped-vanilla-flavoured-goodness. Future models of this notebook will be equipped with the option for holding a Prescott – for heat, we're a little worried how this will pan out. Prescotts are rated at approximately 100W. Perhaps only time and burnt privates will tell.

If you're after the best damn desktop replacement notebook, with a price like this, you'll think you're dreaming. This is by far the best featured and most powerful. With enough brute power and features to rupture your spleen through your ears, you won't find a more powerful, heavily featured desktop replacement out there. Mucho kudos to Dell, the Inspiron 9100 canes arse and radiates excellence. ND

hotaward

SCORE 9/10

Thermaltake Coolall Your Life

Thermaltake Lanparty Coolall Your Life

Coolall Your Life

Purepower

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SILENT and POWERFUL

3 in 1 Cooler | Light | Cable Sleeving | 2 Ball Long Life | Overclock | Performance
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Thermaltake

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  2) In Rear: PCI slot controller
- Intelligent cable sleeving
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- 120x120x25mm Case Fan adjustable fan speed, 1300 rpm ~ 3000 rpm
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- 9 Molex connectors (4 pin)

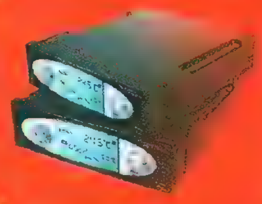
120mm adjustable case fan

Full copper base

3-in-1 cooler with adjustable fan speed for P4/K7/K8

VOLCANO 12

HARDCANO 12



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Unit 1/49 Henderson Rd, Rowville VIC 3178
Phone: +613 9763 1622 Fax: +613 9763 1677
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Logitech diNovo Media Desktop

Supplier:
Logitech
www.logitech.com

Website:
Logitech
www.logitech.com

Phone:
Logitech
(02) 9902 3073

Price:
$499.95

Specifications:
Bluetooth multimedia keyboard; detached Bluetooth number pad with LCD display (MediaPad); MX900 mouse; Bluetooth wireless hub.

The first thing that sprang to mind when feasting our eyes on this was 'Hot damn, these are sexy'. Then there's the price and the smiley face contorts into a gravity-bound mutation. For a keyboard/mouse kit, $500 is kinda painful. As it uses the Bluetooth protocol, it does act as a Bluetooth hub, but wow, that's still a marvellous amount of dosh to spoon out, even for Bluetooth.

The software is easy enough to use, but it creates a 'non-deletable' icon on the desktop called 'My Bluetooth Places'. If you're anything like us and require a clean desktop, it can and *will* be killed via the registry.

Thankfully, the keyboard function 'F-Lock' – which has become a swear word for many Logitech keyboard owners – is switched off by default. For those not in the know, F-Lock converts all F1, F2, etc. keys to useless functions such as New, Send, Print and My Music.

The main keyboard is surprisingly luxurious to use. A great surface and shape with flattish keys that depress a decent amount. Then there's the number pad (known as the MediaPad), which separate from the main keyboard.

Like the keyboard, it's armed with play/pause/next/etc controls, but it has an LCD display, which shows what emails and MSN messages you are receiving.

There's also an onboard calculator. Other than that and currently playing media titles (through select apps), there's shamefully little control over what can be displayed on it.

It's still too big for a remote, though, which was the idea, so removing it from the main keyboard wasn't overly fantastic. With no option to attach it, the blighter tends to 'get in the way'.

The MX900 mouse (identical to the MX700 bar the Bluetooth) is a downright laggy experience for any task that requires instant response, such as gaming. This was proven via the old trick of rapidly drawing circles with the pen tool in MS Paint. This showed many nasty straight lines with the MX900, as compared to the unbeatable MX700, which barely had any straight areas. Surprising for Bluetooth.

This desktop kit is, overall, a collection of beautifully designed equipment bar the damned mouse. As sexy as the keyboard is, you might think thrice before spending so much. ND

SCORE 6/10

Hercules DJ Console

Supplier:
Sound and Music
www.sound-music.com

Website:
Hercules
www.hercules.com

Phone:
Sound and Music
(03) 9555 8081

Price:
$499

Specifications:
20 x 23.5 x 6.5cm (HxWxD); six mono RCA (3x L+R); three 1/8-inch jacks; optical or coaxial S/PDIF digital in/out; DIN5 MIDI-in/MIDI-out; USB 1.0 & USB 2.0 connector; two-metre USB cable. 24-bit 102dB ADC; 24-bit 106dB DAC; 16-bit/48KHz.

Back in the day, if you wanted to learn how to be a DJ you needed access to the venerable Technics SL1200 turntables, a mixer (preferably with crossfader), pro-audio headphones and crates of records, plus loads of lock-up hours learning the music you wanted to play. You might also have needed time and passion to learn mad deck skills (though some DJs with regular gigs can barely beatmix).

But you don't have to do that anymore, right?

Crusty old DJs like me must accept that it's past time to join the digital DJ revolution. It's been more than a decade since jocks began cutting with CD decks, at least half that since bedroom bangers started grooving with mouse, keyboard and desktop mixing software, and a good few years since the mighty Final Scratch turned our world inside out. Time to evolve, damnit.

Hercules' sub-$500 DJ Console holds a lot of promise for new and slow-to-change DJs up for doing something creative with their huge – maybe illegal – music collections.

The rubber-wrapped case, chunky knobs and light-up buttons certainly look the part, but there's one obvious design quirk: the jog wheels are too close to the crossfader.

It's a shame, because the rest of the package is mostly welcoming: setup is fast; the learning curve for the included software (six options) is steep but thankfully short; and the other controls, especially the effects buttons, are smooth to operate.

Use the desktop controls if you want track cueing and beat matching to go smoothly, because the jog wheels are quite sensitive. Unless you have spider fingers, don't even think about cutting quickly with the crossfader, because nine times out of ten you'll bump the wheel just as you slam the next track in – resulting in the new track skipping and your mix falling apart. You *can* get around this problem by switching options in the software to re-assigning the pitch controls as volume faders instead, but then you'll have to set the volume knobs for each channel to act as rotary pitch controls, the in-headphone cueing won't work properly, and your levels will go right out the window. With a slight design tweak, the DJ Console could be an ideal first-time DJ kit, but remember: no matter how technically skilful you are, don't believe for a minute that everything you need to be a DJ is in the box. SR

SCORE 4/10

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The SmartVGA RADEON 9800 XT series, powered by 256MB DDR memory, 256-bit memory interface and thrilling 8-pixel pipeline, is the most visually advanced 3D performer, delivering an immersive, real-time cinematic experience for the most demanding next-generation games...

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omic Magazine's "call of Duty" game performance benchmark (Jan Issue 04) placed the SmartVGA deon 9800XT **at the top of the chart.**
th an average of 81.9 frames per second this card beat all other ATI and NVidia cards tested with the sest competitor scoring under 80 average frames per second.

his fella is the consistent reigning champ of the 9800XT world"
faster performance, but also this one is cheaper" Atomic, Framerate Issue 36.

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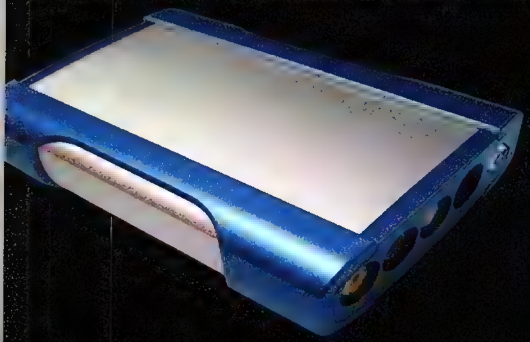

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www.albatron.com.tw

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Computex Taipei 2004
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FX5700U
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Atomic
Jan.2004, Australia

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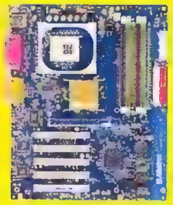

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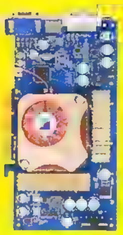

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- NVIDIA® GeForce™ FX5900XT GPU (Clock 390 MHz)
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- AGP 8X with D-Sub, TV-Out ports
- Microsoft® DirectX® 9.0 & OpenGL1.4 optimizations and support

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Albatron

Western Digital Media Centre

Supplier:
Tech Pacific
www.techpacholdings.com

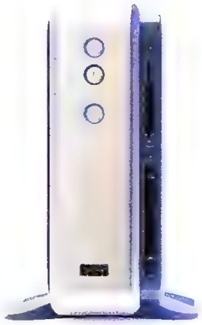
Website:
Western Digital
www.wdc.com

Phone:
Tech Pacific
(02) 9381 6000

Price:
$530

Specifications:

External 250GB 7,200RPM with 8MB cache hard disk drive; 8-in-1 card reader; USB hub; USB 2.0 and FireWire ports.



While PATA and SCSI drives have served us well for a long time, both have limited practical application. SCSI's high cost of drives and controllers has stopped them becoming products of choice for consumers in the mass market, except in isolated scenarios like DV and music editing. PATA on the other hand lacks hot swapability, requiring you to down a machine to add or remove hard disks. Serial ATA (SATA) changed this by featuring different length power pins, allowing you to earth a drive as you power it and stopping you from turning your drive into a smokey paperweight. Western Digital has combined the best of both worlds, and brought it to you in an attractive and incredibly portable storage product.

While it's pitched at the storage hungry rather than the speed freaks, this drive is a demon, boasting an 8-in-1 card reader and both instant and scheduled backup with the included copy of Dantz Retrospect 6.5. Using the physical buttons on the drive housing, instant backup uses a wizard-style interface to select directories and whole drives and back them up in one step. Easy as falling out of a tree.

The scheduler function runs automated backup as often as specified, whether that be daily, weekly or monthly archiving, perfect for the forgetful and the senile.

Digital camera and notebook users will benefit from the wealth of space and speed, a huge upgrade from standard 4,200RPM disks, giving a significant upgrade to performance.

Although it has both USB 2.0 and FireWire port connectivity, the WD Media Centre needs to be operating with USB to be able to use either the USB hub function or the multi format card reader, a real bummer for the FireWire users without USB 2.0. LAN leeches will love this drive for its size and speed, making it easy to copy files and still game at the same time.

Great for anyone on the go, the built in support for most major memory card formats provides flexibility, while anyone who routinely runs out of hard drive space will benefit from this sort of mammoth capacity figure. If you've got the cash to spare, it's big, beefy and impressive, but still cheaper to buy an internal IDE or SATA. DC

SCORE **8/10**

Thermaltake Hardcano 12

Supplier:
Thermaltake
www.thermaltake.com.au

Website:
Thermaltake
www.thermaltake.com.au

Phone:
Thermaltake
(03) 9763 1622

Price:
$99

Specifications:

5 ½-inch bay-mounted monitoring unit; four fan connectors; four temperature probes; automatic speed throttling; variable degree heat alarm; four molex-to-three-pin cable converters. Includes screws and spare jumpers.

Bay-mounted monitoring devices like Thermaltake's Hardcano 12 are more than just cool to look at. It is both nifty and handy to see, at a glance, how fast your fans are spinning and the temperature of your components. Invaluable data when diagnosing problems, and it's the height of excitement to pretend you're Mr Scott, ramping fan speeds and yelling 'She canna take it Captain!' at your monitor, neighbours, and unsuspecting girlfriend/boyfriend/Ewok doll.

The Hardcano 12 lends itself to a clean package – other than the manual, a couple of power cable converters and some spare screws and jumpers, there isn't much lying loose in the box. The main unit is lightweight and of smooth construction, designed for insertion into a free 5 1/2-inch bay, with a face panel that's aesthetically swanky except for the product's branding, which looks out of place and a little ugly. Trailing out the back is the main molex power connector, four three-pin fan power connectors and four thermal probes. Each fan connector is paired to a probe.

Along with temperature and fan rpm monitoring, the Hardcano 12 comes with a heat alarm and fan speed adjustment controls. There are two modes of operation, auto and manual. While set on auto, the Hardcano will handle how fast the fans spin, increasing the rpm as the temperature reaches that set on the alarm. If the temperature exceeds the alarm's preset, it will beep continuously until the temperature drops to safer levels.

In manual mode, it's up to you to change the fan speed using the negative and positive buttons, with the lowest setting being 50 percent of the fan's maximum speed, and the highest however fast the individual fan can go.

It's all neat-o, yes, but there are some quirks. The rpm reporting is sometimes erratic, with a couple of our 5,000rpm fans showing '8,888rpms' from time to time. Also, the alarm can only be set in 10°C increments, from 40°C to 70°C.

Other than these niggles, there's not much to complain about. The Hardcano 12 does a fine job of system reporting. Although some additional functionality in the form of CPU speed detection, bus speeds etc, would have been nice, the Thermaltake Hardcano 12 makes up for it with its easy set-up and tidy package. LB

SCORE **8/10**

I am the shape of all things given by the creator; I have no beginning and I have no end. I am the shape of life itself. What shape am I? O

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2004 GT Edition 3D Cooler-Ultra

John Gillooly gets hot and heavy with this cracking cooler.

Supplier:
Synnex
www.synnex.com.au

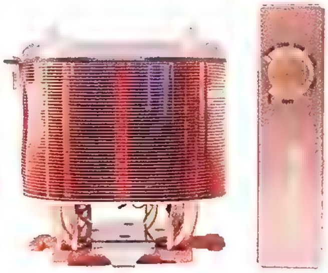
Website:
Gigabyte
www.gigabyte.com.tw

Phone:
Synnex
1300 880 038

Price:
$89

Specifications:

Copper Heatsink; fan speed adjustable between 2,000 – 4,500rpm; supports Pentium 4, Athlon 64 and Athlon XP.



It has been a long time since we have seen someone enter the heatsink market with such a bang as Gigabyte with its 3D Cooler a few months ago. It was somewhat of a surprise that the cooler worked as well as it did, because at first glance it looks like one of those novelty products that crams as many novelties as possible in but has the cooling efficiency of a SARS patient's forehead.

But by god it worked, and worked magnificently, easily sweeping away the heatsinks we had tested and snatching the coveted crown of Grand Poobah of cooling. So scepticism abounded when the 2004 GT edition 3D Cooler-Ultra landed in the labs.

The Ultra is a logical extension of the 3D Cooler design, substituting the aluminium heatsink fins for copper, a common method of squeezing more cooling performance out of a heatsink design. It is a trade off though, because the 3D Cooler-Ultra weighs in at a whopping 780 grams, a whole 80 percent heavier than the aluminium version.

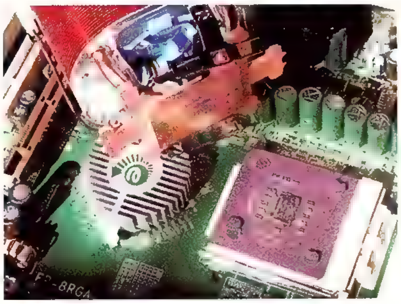
This causes a curious problem with the 3D Cooler-Ultra. Like its predecessor, it supports not only the heat spreader wearing Pentium 4 and Athlon 64 CPUs, but also the fragile and defenceless core of the Athlon XP, and as you can see from the photo of our sacrificial Thunderbird it is not an ideal solution at all. The heatsink mounts on the Socket A lugs with a single clip, around which the cooler can rotate quite freely, slowly rendering the core into a silvery pile of silicon dust. Of course our test was exaggerated, but we would expect a similar problem to develop over time as you lug your system to LANs and the like. And heaven help you if you drop your PC.

This is very much a problem specific to using the 3D Cooler with the Athlon XP however. When using it with the Pentium 4 or the Athlon 64 the combination of protective heat spreader and more solid mounting brackets mean that the cooler will stay in place and it would need a system shattering level of shock to cause similar damage.

We focused our benchmarking of the 3D Cooler-Ultra upon performance with the Pentium 4. To do this we used our heatsink testing rig, Chernobyl, set to output at both 80 and 100 watts. We decided to kick it up to 100 watts to simulate the hotter Prescott cored Pentium 4 CPUs, while the 80 watts is analogous to the Northwood core. Testing was done at an ambient temperature of 25 degrees celsius.

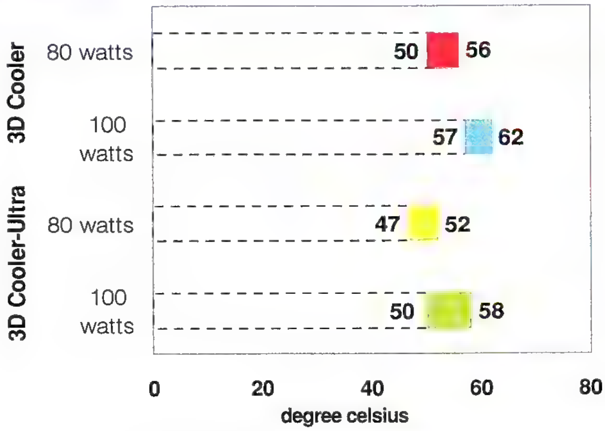
We ran the 3D Cooler-Ultra at both its maximum and minimum speed settings, and lined it up against the previously unbeaten vanilla 3D Cooler. Again we were pleasantly surprised that not only did the Ultra win out at 80 watts but it absolutely lapped up the extra heat generated at 100 watts of output, performing significantly better than the vanilla model.

This left us in a dilemma. It is hard to recommend the 780 grams of copper for the fragile Athlon or Athlon XP; it simply puts too much potential stress on the delicate core. But when it comes to the Pentium 4 and Athlon 64, this is a truly outstanding product. We are still amazed at how Gigabyte has managed to improve an already great product, which kicks arse at even the most noiseless of fan speeds, and will really lap up the heat pumped out by Prescott. JG



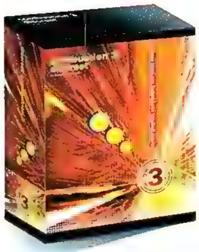
ABOVE: This is why we don't recommend the 780gm cooler for the Athlon XP.

Chernobyl Heatsink Rig



ABOVE: The above graph shows the temperatures achieved with the fans set to minimum and maximum speeds. Testing was done at an ambient temperature of 26 degrees celcius using our Pentium 4 heatsink mounting bracket on Chernobyl.

SCORE 9/10



discreet combustion

artomic

This image was based on the Quake Series. It was created using Amophium for the more complex/harder to shape areas, Poser 5 for the head and some of the armour, Bryce 5 for the background, basic shapes and final render and a good old touch up with Photoshop. It took a couple of days to complete.

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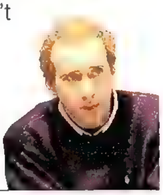
Games

Sorry Valve

John Gillooly explains why Far Cry raises his bar.

> '…we all have to realise we write in a genre, so we must find originality within that genre. Did you know that there hasn't been a new genre since Fellini invented the mockumentary…?'
>
> **Donald Kaufmann, Adaptation (2002)**



At last year's E3 I was one of the lucky ones that got a chance to sit through Gabe Newell's demo of Half-Life 2. It was one of the crying shames of the event that nearly every session in ATI's pokey theatre was booked out well before the explosion of gaming bliss that is E3 even began.

What it did mean was that there was a high chance of running into someone interesting in the little two row booth. While I missed Robin Williams I did end up sitting next to a guy called David Kushner, who at the time was pimping a book he had written called *Masters of Doom*. This somewhat patchy tome chronicles the rise of id Software, focusing particularly on John Romero and John Carmack. In other words, I ended up seeing Half-Life 2 for the first time while sitting next to one of the worlds most prominent id software fan boys.

Demo over and a once chattering audience left the booth in complete awed silence. Mr Kushner turns to me and says 'it's alright, but it's not really that dark and moody'. Disbelief is one word to describe my reaction (my actual words were something like 'that was fucking amazing'). Half-Life 2 quite simply blew everyone away with more important things than scripted monsters and the next level of gloom. It showed a new world of physics and AI interaction, leaping well beyond what had come before.

It unfortunately overshadowed every other game at E3, including Far Cry, which was almost as good but still slightly pale in comparison.

Well, Crytek is now having the last laugh. When Far Cry was pushed back from a Christmas release it appeared that it may be overshadowed by Half-Life 2. Well, HL2 is still nowhere to be seen, but Far Cry is here and it is amazing.

To put it in simple terms, Far Cry has raised the bar for first person shooters higher than any game since Half-Life. And the great thing is even though it is graphically stunning, that is not the reason.

Far Cry stands out in its introduction of vast outdoor areas, interactive environments and dollops of atmosphere. Pinned down by a guy manning a minigun? Why not shoot out the supports of the propane tank on the hill behind him, or the chains supporting the tonne of girders dangling over his head.

It isn't quite at the level of interactivity that Half-Life 2 is promising, but who cares? So far that game seems to only exist in the form of a few videos, some floating source code and dinky little vouchers sporadically hiding in RADEON boxes. Far Cry is actually here and playable. That is what counts.

Like Half-Life it doesn't create a new genre, or try to fuse together multiple ones. It is just a spectacular leap in first person shooter design. Which is as refreshing as it get nowadays. It has been a long time since a new genre has appeared, or a blindingly new direction in gaming has been taken.

Innovation has been unfortunately rare. Asking around the office, the last successful innovation that we could pinpoint was the rise of the MMORPG, and that happened back in 1996 with Meridian 69.

The most recent 'new thing' we could think of was EA's Majestic. That was an attempt at immersive, episodic gaming which stepped beyond the bounds of the PC by sending emails, faxes and phone calls to participants. It tried to take gaming beyond the conventional but was canned after subscriber numbers dropped from 800,000 initial signups midway through 2001 to 10,000 paying customers by the year's end.

While the absence of anything mind-blowingly new in the gaming segment is disappointing, Far Cry has now set a new benchmark for the first person shooter, and that will in turn force other developers to kick it up a notch to compete. For that reason alone Far Cry deserves a prominent place in the annals of gaming history.

ShortCircuits

Half-Life 2 may still be an unrealised dream, but at least mod makers will have something to play with as they wait for the ambient temperature of hell to approach 0 Kelvin. A version of Softimage|XSI for Half-Life 2 has been released, allowing modellers to start building the next great Counter-Strike clone, keeping their RADEON 9800XT cards warm while they wait for news from Valve. You too can join in the fun and grab it at www.softimage.com.

Namco has been around the gaming world for many years, but it has now announced a move into PC games publishing. And it has done it by snagging Flagship Studios, the new baby of Bill Roper and Co from Blizzard North. No news yet on what may eventuate from the relationship, but we have a sneaking suspicion it will be worth watching.

Sony finally let a few more details out about its PlayStation Portable (PSP) during a speech at GDC. The PSP will indeed sport 802.11b wireless networking and will connect to both the PS3 and PCs. There are currently 81 developers working on games for the handheld, which is apparently much easier to develop for than the notoriously tricky PS2.

BUZZWORDIKAN

Nintendinitis

A catchphrase term for the development of lesions or tendon strains from overintensive use of console controllers. The term refers to physical injury of the hand and not to other documented console related ailments such as epilepsy, faecal incontinence or daytime enuresis.

○ I occur once in every minute, twice every moment, but never in a hundred thousand years.

Nintendo DS or speculative BS?

While waiting for next generation console announcements that never happened, John Gillooly came across some mystifying specs for Nintendo's new handheld.

Usually, a sheet of detailed hardware specifications would be enough for us to understand how a product will work, but in the case of the mysterious Nintendo DS, the leaking of hardware specifications has just caused more confusion.

Nintendo has been incredibly coy about its new product. Despite the fact that it is a handheld device, it is not a successor to the Gameboy Advance; rather it's being pushed as a totally new kind of gaming platform (much like Nintendo's failed VR gaming experiment, the Virtua Boy). So far, the official releases have been sparse, however; we do know it will feature two 75mm TFT screens – arranged vertically – dual CPUs, and a completely uninformative 'up to 1Gb of memory'.

Naturally this sparked wild speculation among the hordes of Nintendo fans on the net, and sure enough a spec sheet leaked out soon after. The specs are for a system called 'Nitro', which was allegedly the codename for the DS during development, and while we contacted Nintendo Australia about the specifications, we received the predictable 'no comment' reply.

Although the general consensus is that the specs are legitimate, there is no way of knowing how they will relate to the real world system. In fact, the sheet itself highlights the fact that Nintendo may well change the hardware right up until launch time.

Debate is still raging over how the differing CPUs will operate and the performance level of the 3D graphics core. The specs seem to point to 2D performance similar to the GameBoy Advance, but the closest analog to the 3D core is that seen in the Nintendo 64.

What's really interesting is the inclusion of a touch screen and 802.11 wireless. While the addition of wireless capabilities would appear to be included for multiplayer gaming purposes, an analyst report from the US has claimed that the device would also pack the capabilities for instant messaging.

This instant messaging was also used to explain the touch screen. Input of text would be impossible using the limited gaming controls, but a touch screen and stylus would be a great input solution.

Of course, the most obvious use of a touch screen for gaming would be to have the second screen running as a pokeable control panel.

The only solid information on the Nintendo DS is that it will be unveiled at a press conference, scheduled for this year's E3 in May. In the meantime, it remains a major source of mystery. Even though we know that it will have two screens, nobody has been able to say what the device will look like. Knowing Nintendo, the device will certainly be different, we just have to wait and see whether it will be a Gameboy scale winner or a Virtua Boy scale disaster. JG

Nintendo 'Nitro' Specifications

Main CPU	ARM946E-S running at 67MHz
Secondary CPU	ARM7TDMI running at 33MHz
Memory	4 MB
Graphics	2D and 3D graphics cores
Sound	16 channel ADPCM/PCM with Microphone
Display	Dual 256x192 resolution screens
Networking	802.11 based wireless using a custom protocol
Input	Touch screen, D-PAD, shoulder buttons, A and B buttons

ABOVE: A summary of the leaked Nintendo 'Nitro' specifications sheet. The picture should be clearer once Nintendo launches the handheld during a press conference scheduled for E3.

Developer Quote of the Month

'When I first heard it would have two screens, I thought it was a Game & Watch remake, but on further inspection I found it is different. I'm excited by it, and I also have an overwhelming feeling. I think the hardware will be very good at creating intense feelings.'

Namco developer Yoshizumi on the Nintendo DS.

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Maxtor 300GB ATA133 2MB = $420.00
Maxtor 160GB SATA 8MB = $212.00
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Memory

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Corsair 256MB PC-2100 = $85.00
Corsair 512MB XMS-2700 = $160.00
Corsair 512MB XMS-3200 = $200.00
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The Engine Room

Cranking out tears of joy

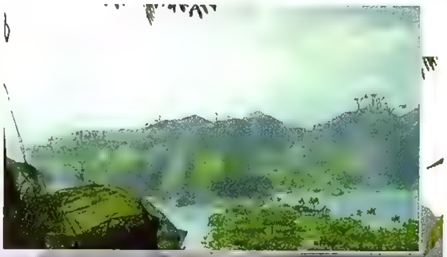
The CryEngine makes its bold debut with Far Cry. James Wang looks behind a beautiful game and finds a remarkable engine.

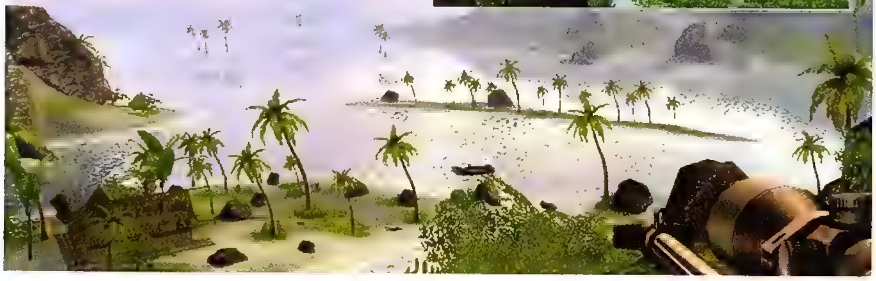
I'll be the first to admit – I wasn't a fan of Far Cry when I saw the first screenshots. It seemed to have all the attributes of a graphics tech demo and little substance to match the grandeur. By the time I was halfway through the early build though, I was sufficiently overjoyed to change my assessment.

Despite the cheesiness and lack of conviction, in the end, the sheer beauty of the game overwhelms you. The CryEngine just doesn't stop.

The desire to create truly massive outdoor environments dates back to games such as Outcast and Tribes. In that nostalgic era (pre-DirectX 7.0), having a huge environment soaked up so much processing power that you couldn't really render much more; a tree to decorate a hectare of terrain was considered a visual blessing. Wave those days goodbye – Far Cry has more trees, shrubs and life in a single frame than an entire level in Tribes, or Tribes 2 for that matter.

The Far Cry engine started its life as a tech demo produced in close collaboration with NVIDIA to show off the champion card at the time, the GeForce3. The German developers at CryTek used OpenGL and custom 'NV extensions' to best showcase the emerging pixel shading technology. Of course, what they truly wanted was to make a game. After the success of the demo, they scored a publishing deal with Ubi Soft and Far Cry was born. To give the game maximum compatibility, a DirectX renderer was written. Although the initial speed lagged greatly behind its OpenGL counterpart, it's now up to date, as Cevat Yerli, technical director at CryTek explained to us: 'after we brought up the optimisations on DirectX to OpenGL speed, it's pretty equivalent in terms of speed and feature-set, particularly on [the] newest programmable hardware supporting Pixel / Vertex Shaders 1.1-2.0.'



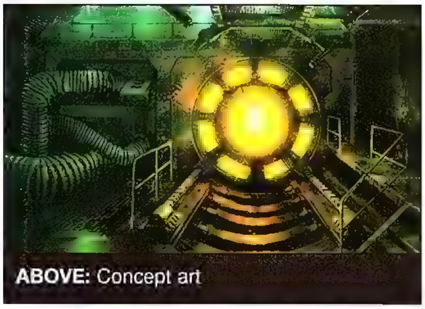


LEFT & BELOW: One of the main advantages of CryEngine is its ability to render expansive terrain without compromising on details.

At the heart of what Far Cry attempts to achieve is a sense of freedom that follows the mantra, 'If it looks like you can go there, you can'. The significance becomes obvious when you realise that not only can you go virtually everywhere, but everywhere is, well, huge. And journeying across the world of Far Cry is not one where you feel like you're swimming through an endless sea of flatly textured hills with green to convey grass and red for earth (*à la*, Tribes) but rather every scene is so meticulously presented that at times I'm tempted to rest my gun and lie on the beach if only there was a 'prone face up' button. Not exaggerating, despite the lifelike scale, Far Cry does not compromise on detail; forests cover entire islands, tropical palms sway on the beaches and wildlife both on land and in the air flourish.

What's made this once incompatible dual of scale and detail possible is the huge increase in fillrate of graphics hardware. Trees in Far Cry are not technologically advanced. Like all games, the leaves are alpha textured polygons. If it always bothered you why leaves seem to be locked in a 'flat plane', it's because they are drawn much like hanging sheets of overhead slides, painted green where appropriate. While the size of the map is of no issue, since it has been achieved in other games many years ago, the key problem today turns into a case of extreme overdraw. That is, the forest composed of hundreds of trees per frame superimpose each other such that a pixel may need to be calculated tens of times before the final result of which pixel is visible can be determined. A highly optimised level-of-detail (LOD) system is clearly crucial as Yerli explains: 'we use for terrain, a dynamic LOD. For vegetation we use imposters (geometry warping into sprites) and for characters we use, after trying all sorts of LODs (progressive, multi-res-meshes etc.), a standard discrete LOD system'.

Dynamic LOD for terrain is standard on most games and static LOD for characters is agreed to be optimal (S.T.A.L.K.E.R. Engine Room, *Issue 32*). For the most concentrated area in Far Cry – forests – tree LOD is the key to making dense vegetation possible. At some distance, the CryEngine will morph polygonal trees into 'imposter' replacements. These replacements are a type of sprite called billboards which are rendered polygons that rotate as to always face the viewer. When imposters take the place of trees, not only does it save a lot of fillrate, it is also automatically cached so that rendering the whole 'imposter forest' is reduced to


ABOVE: Concept art

accessing the same data on a high speed cache. At close up, you see real, fleshed out trees but across the distance the trees are actually 2D imposters constantly rotating to fool your eyes – very clever.

Of course, Far Cry is not all outdoor paradise; it takes great pride in having an equally robust indoor renderer. So far all the games to have visited Engine Room have used *either* stencil or shadow maps. Far Cry is the only one we've come across to use both. Yerli explains: 'we are not fanatic about certain technologies. We use what works best in each scene. For examples: in [the] outdoors, sharp-shadows look incorrect as sky is diffusing light and shadows thus we use a soft-shadow-maps approach. In indoors, depending on the scenario, we use more hard lights – hence stencil or sharp shadow-maps. In some scenes we are CPU bound and enable shadow-maps to achieve similar results. The designer ultimately controls the quality here.'

The most promoted piece of technology in Far Cry is of course Polybump. Although it was stunning at the time of announcement, since then pretty much all FPSs are adopting it (although admittedly, few have managed to ship). Polybump is CryTek's name for dot3/normal bump mapping. Although the basic algorithm is the same, Yerli believes Far Cry's implementation is more refined: '...we added to our Polybump technology a number of accurate calculations to retrieve maximum quality normal-maps, we added so-called accessibility maps to improve lighting and all that makes it still superior to our known 'competitor' solutions. We offer the trial versions online for those who need proof. Our source models have usually around 500,000 polygons and our target ones have usually around 2,500-4,000 polygons.'

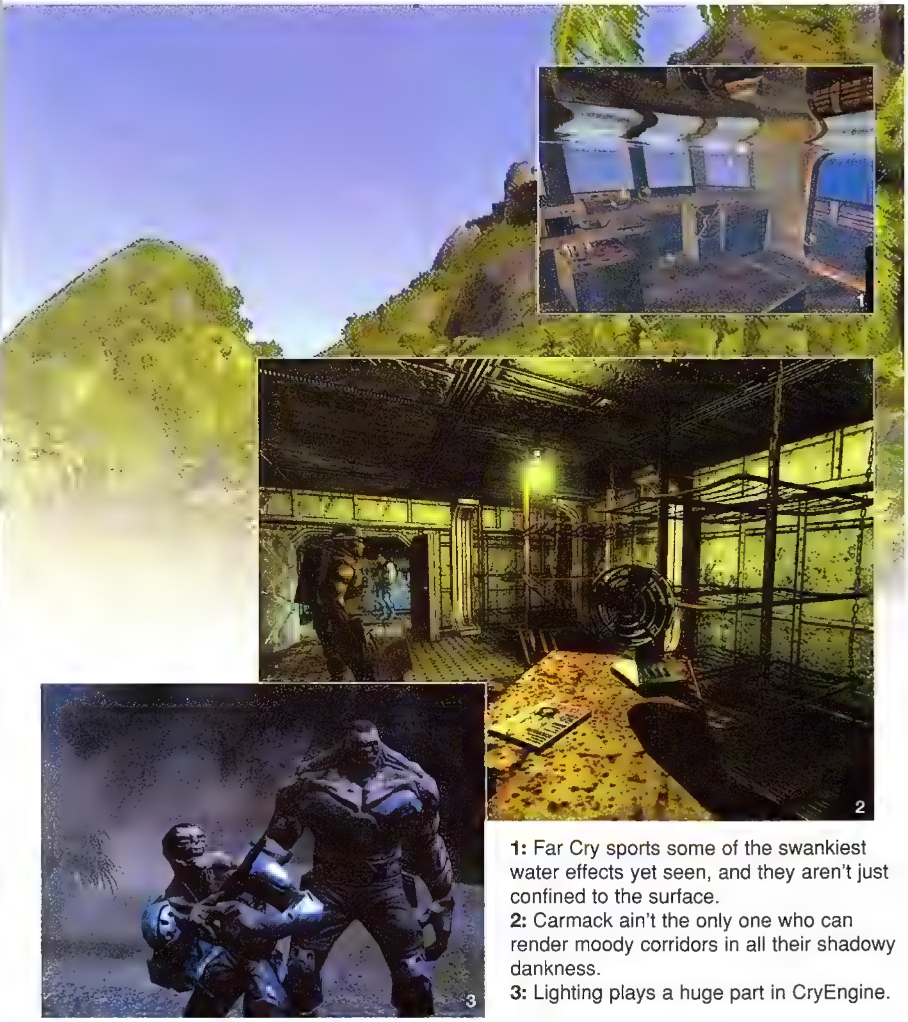
For Polybump to work at all though, there must be dynamic lights; without movement relative to a dynamic light, the illusion from normal maps can't form. Since the outdoor areas are statically lit, this would spell disaster for all the facial features of a soldier the second he stepped away from a dynamic light. (This incidentally is also why normal maps work so well for Doom 3, since all the lights in the game are dynamic.) To overcome this problem, a unique 'dot3 lightmapping' technique is employed. Where bump mapping and lightmaps were traditionally mutually exclusive, under this technique they can be used together. This produces accurate normal geometry lit from both static (outdoor) and dynamic (indoor, special effects) lights.

While the difference in lighting intensity between indoor and outdoor in the real world differ my many orders of magnitude, in 3D engines, the difference is rather miniscule. To get around this limitation, one can use either DirectX 9.0 floating point/high dynamic range rendering, as in Half-Life 2, or hack the existing lighting system. Far Cry takes the ladder approach by modulating colour operations by two while cutting ambient light by half. This results in a diffuse component that is twice as bright as normal. In outdoor areas with dot3 lightmaps, a four-fold overbrightness can be achieved. Contrast this with games that don't bother to account for high dynamic range then the difference becomes apparent; UT2003 by comparison seems more like a 'massive indoor' game rather than an outdoor one.

What makes this conclusion satisfying is that Far Cry, unlike the other equally impressive and ambitious games in production, has now shipped and is actually available on store shelves (sorry Valve, a voucher for a game that is probably not due until October does not count).

Given the relatively inexperienced team, the totally in-house engine and it being CryTek's first project, this is most impressive.

Sure, it's not perfect; the disparity between the best looking outdoor areas and the not so well furnished indoors can be a gripe, but who else has done better? I'm glad that Far Cry has, despite my gravest doubts pulled through, and done so with great splendour. JW



1: Far Cry sports some of the swankiest water effects yet seen, and they aren't just confined to the surface.
2: Carmack ain't the only one who can render moody corridors in all their shadowy dankness.
3: Lighting plays a huge part in CryEngine.

Far Cry

Darren Ellis loves it when genetically engineered monkeys ambush him 'deep in the jungle'.

PC Specs

Developer:
Crytek
www.crytek.com

Publisher:
Ubisoft
www.ubisoft.com.au

Distributor:
Ubisoft
www.ubisoft.com.au

Phone:
Ubisoft
(02) 8303 1800

☺ Immense levels, smart level design, gorgeous graphics.

☹ Occasional clipping problems, high spec requirements.

O I am blue, then black, but am not bruised. I am pierced and poisoned, but am not harmed. I touch the earth but do not walk, I am up above but am no bird. What am I?

ABOVE: Welcome to paradise!
RIGHT: Graphically, Far Cry is a masterpiece. You'll spend as much time shooting baddies as you will barrels.

Originally, this review was to consist of about three screenshots, a score and the words 'HOLY SHIT!' in large 30-point type across the middle of the page, however, Ben said that an *Atomic* review needs a lot more words than that, *even if it is a review of Far Cry.*

So let's get the specs out of the way before we get down to the particulars. Far Cry is an FPS, but an FPS with a hell of a difference. While the guns and baddies are standard fare, the level design and the underlying game engine isn't. The game's graphics are incredibly gorgeous and the levels are amazingly vast, and we really do mean vast. You can see for miles in Far Cry, but instead of repetitive landscape boxes you can actually travel wherever you want.

Unfortunately the story-line is crap. Far Cry begins with an intro movie that makes no sense. You're on a boat with a woman, woman dives off, boat blows up, you fall into ocean and sink down, cut to nightmare flashes of beasts attacking you in jungle, then the game proper begins as you drag yourself out of the water and find a horde of people shooting at you. It makes no sense, and the feelings of of 'who the hell am I?' and 'what the hell just happened?' stay with you long into the game.

ABOVE: It's *Dr. No* meets *Doctor Moreau*. But with more guns.

Nonetheless, the game engine gives Far Cry a massive advantage in gameplay and level design over anything that's ever come before. The levels are so well designed that there are almost always multiple ways to reach your target, without falling into a typical game's linear level design. For instance you can fight your way through an installation that tunnels through a hill, or you can fly, run, drive, boat or swim over or around the same hill to attack from a different angle.

We spent a good two hours battling through a completely irrelevant side of an island to get to a goal that didn't exist because we were distracted when the important 'take the right fork' message came through on our walkie talkie and we took the left fork. Two fun hours of battling later, we realised our mistake and backtracked through a couple of miles of blasted landscape, to find another few fun hours of battle on the correct side of the island. Incidentally, you never need to go to that other side, it's just *there*. This ridiculous amount of freedom and level design means you can't wait to start again and explore every inch of every island.

As well as multiple attack and strategy paths, the generous level designs and landscapes mean that you can play levels and sub-levels in two manners – firstly, you can slowly make your way through the level, sniping and killing every bad guy you can find, our secondly, you can blaze through a level by running like hell, leaping off cliffs and swimming around islands, driving like a crazy-arse mofo between trees and over hillocks, and just going apeshit across the archipelagos.

The levels were so huge in Far Cry that at times we played with a mix of both styles – the former when we were playing as normal, creeping through tunnels, sneaking through the bush, and the latter when the only way to progress was to make a mad dash for it and hope we didn't get a bullet in the back.

It's all priceless. DE

BELOW: Babes and grenades. Aw yeah.

Requirements:
1GHz CPU; 256MB RAM; 64MB DirectX 7-level graphics.
Recommended:
2.4GHz CPU; 1GB RAM; best graphics card possible.

SCORE 9.5/10

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PHOTOCOPY THIS YOU FOOL!!

Unreal Tournament 2004

Allison Reynolds asks more from a game than a quick spray and pray

PC
Specs

Developer:
Epic Games
www.epicgames.com

Publisher:
Atari
www.atari.com.au

Distributor:
Atari
www.atari.com.au

Phone:
Atari
(02) 8303 6800

☺ Frantic adrenaline based gaming is back!

☹ American accents on the text-to-voice. HUGE Install.

ABOVE: Accept the mission for an adrenaline-induced onslaught.

The Unreal Tournament family of FPSs has always been in the top three games guaranteed to bring about an adrenaline induced anal sphincter so pointed it could autograph a copy of *Atomic*. Expectations for the Unreal Tournament 2004 (UT2k4), prior to its release were high. Indications of how high were apparent with the demo being played competitively at LANs and gamers flocking to chemists to stock up on Preparation H for their sphincter issues.

Using the tried and true formula of its predecessors, the single-player portion is based on a blood sport set in 2362. Your mission: take your team to the finals and kill off any opposition while making truckloads of cash. As you work through the various missions, new game modes open up to you. If you complete all at the highest skill level you will unlock player skins and top notch team-mates.

But who plays UT for its single player missions anyway? Multiplayer is where UT2k4 kicks arse and where its longevity has, and will always, lay. Add over 20 new maps to the existing 2k3 maps, text to voice capability, new weapons and vehicles and you have got one hell of a game. Onslaught mode (destroy enemy bases in sequence) invites a greater tactical approach to UT than the usual "spray and pray" slaughter.

UT2k4 is available as a 6 CD or the special edition 2 DVD install. Make sure you have over 5GB spare on your HDD as the textures folder comes in at close to 2.8GB alone. And what textures! Absolutely the most gorgeous scenery and architectural details to have your gibs splattered over. There is a good range of map sizes and types that will keep gameplay fresh. Movement is smooth, though the physics could have been better done in some maps where there is interaction with the environment (water,snow).

Couple all of this goodness with the included applications for character and map mod making and it will be a long time till this game falls off the LAN and internet sever lists. AR

hotaward

Requirements
Pentium III or AMD Athlon 1.0GHz processor; 256MB RAM; 5.5GB free HDD.
Recommended
Pentium III or AMD Athlon 1.5GHz or faster processor; 256MB RAM

SCORE 9.5/10

Battlefield Vietnam

John Giloolly discovers an evolution but not a revolution

PC
Specs

Developer:
Digital Illusions CE
www.dice.se

Publisher:
Electronic Arts
www.electronicarts.com.au

Distributor:
Electronic Arts
www.electronicarts.com.au

Phone:
Electronic Arts
(02) 9264 8999

☺ An evolution of one of the best online multiplayer games out there; new gameplay and vehicles.

☹ Nothing revolutionary about the gameplay.

ABOVE: Fast action with some subtle differences to BF: 1942.

In the Counter-Struck world of online gaming Battlefield 1942 was a blast of fresh air. It took the wondrous but clunky multiplayer ideals of Codename Eagle and evolved it into a sublime experience. Testament to this is the number of expansive, vehicle-based shooters that are trying to ride the slipstream to success.

After some lacklustre expansion packs, developer DICE has now released Battlefield Vietnam, which transposes the action from the open terrain of BF: 1942 to the more claustrophobic environments of the Vietnam War, oops, Police Action.

The choice of Vietnam is a smart one, allowing the gameplay to evolve to include jet fighters, helicopters, booby traps and more sophisticated missiles. It also means that the game has less of a tank focus than the original thanks to tighter jungle terrain.

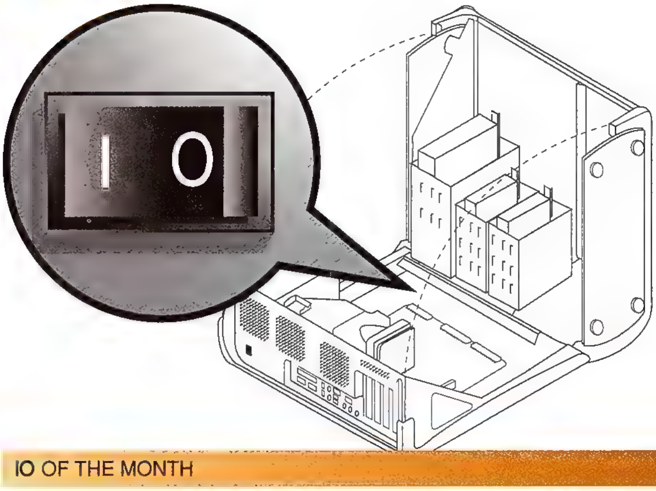
Complimenting these new environments is an overall improvement to the graphics and audio in the game, replicating some very familiar battles and environments. You can leave your heart to the Sappers round Khe Sanh, tread the Ho Chi Min trail or fight through the streets of Hue *à la* Full Metal Jacket.

Perhaps the biggest competition to BF: V will be the Desert Combat mod for BF: 1942, but there are significant differences between the two. The overall pace of BF: V is a lot closer to BF: 1942 than Desert Combat. This is especially evident in the aircraft, whose controls are a lot more forgiving than those of Desert Combat. Fighters are a little slower than their DC counterparts, making them both easier to control and to shoot at. Helicopters are also a lot easier to fly, however mastery will take some time.

It is hard to shake the niggling suspicion that this is what the expansion packs to BF: 1942 should have been. This is not a criticism as such, as Battlefield Vietnam is a great evolution of the franchise, providing a subtly different experience to BF: 1942 while keeping the same core focus on fast action that helped to make its predecessor such a success. JG

Requirements:
933MHz CPU; 256MB RAM; 2GB HDD; DX8.0 level graphics.
Recommended:
2GHz CPU; 1GB RAM; DX9.0 level graphics.

SCORE 8/10

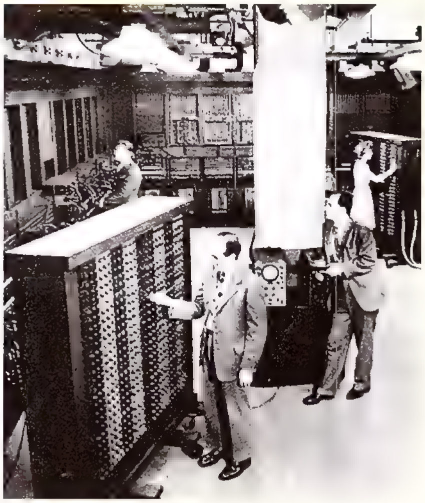


IO OF THE MONTH

Clan analog

I After watching a not so recent episode of *Doctor Who* ('The War Machines') in which an intelligent computer tries to take over the world (Think *Terminator*'s Skynet with only 2KB of RAM) I started to think about analog computers. While working at RMIT some time ago I came across parts of an analog computer in a display cabinet. My question is, how does an analog computer function compared to a digital computer? Are there any working analog computers in existence? Would it be feasible to build an analog computer today?

Jason O'Keeffe



ABOVE: If you think the CPU's big, you ought to see the video card.

O Analog computers represent information with variable quantities – positions of components, voltages, or other things that can be set to different values to represent different input values. Kids learning about maths with those coloured wooden Cuisenaire rods are doing analog computation.

Electronic analog computers work by using thermionic valves not as simple relays, but as variable amplifiers, so that the widely variable output values of different valves can be added and subtracted and multiplied according to the values of other valves.

Digital computers, in contrast, do calculations with a 'finite-state machine', in which values are represented by things that have distinct possible value levels, with nothing in between.

Mechanical analog and digital computers are still in pretty common use around the world. An abacus is a digital computer, and a slide rule is an analog computer.

I don't think anybody uses *electronic* analog computers for anything any more; they all date from the valve days and thus take up lots of space and power, are absolute monsters to keep in working order, and are quite easy to emulate on current hardware anyway. Sure, you could make one (and make it much smaller, by using solid state hardware), but it wouldn't be useful for much.

Australia's first computer, CSIRAC (www.cs.mu.oz.au/csirac), is now 'restored' and on display in the Melbourne Museum, but the restoration didn't extend to actually getting it to run. A museum curator has been quoted as saying that powering the 30 kilowatt monster up today would probably cause it to catch fire.

IO of the month wins a Logitech MX700!

Slick as a stick and twice as flexible!
io@atomicmpc.com.au

Slot selection

I After reading *issue 38*, I've decided to make a RAM drive for my page file. Is there a way that I can assign the RAM disk to a particular memory slot (in which I would have a cheap yum-cha 512MB stick) and use my two sticks of good RAM for everything else?

Malcolm Duckett

O No, you can't do this. Nice idea, though!

Big discs

I I am thinking of purchasing a DVD burner (since the price has dropped a bit – $900 or so!), however, I am still unsure of media compatibility issues. For example, when DVD technology came out, it was said to be capable of storing up to 17GB, but most DVD burners (if not all) on the market only support up to 4.7GB discs. I do not want to buy a DVD burner now (that only supports 4.7GB) and then another in a few months when they support 10GB or more.

Gareth P

O They won't be 10GB, but we *will* have considerably bigger writable DVDs soon.

The capacity of one side of a basic single layer 12cm DVD is 4.7 billion bytes (not the usually quoted '4.7 gigabytes'; a gigabyte is 1,073,741,824 bytes, and 4.7 billion bytes is 4.38GB). Recordable and rewritable DVDs already have that much capacity. You can copy the entire contents of a full single sided, single layer DVD to one DVD+/-R or RW disc.

Double layer DVDs have a capacity of 8.54 billion bytes (7.95GB; those '17GB' DVDs are double-layer, double-sided, and hold less than 16 real gigabytes), and we're only now seeing writable DVDs that offer that much capacity. As I write this, they haven't hit the consumer market yet, though they may just be doing so by the time this column makes it into the magazine.

> 'The better ventilated the PC is, and the less heat its components emit, the closer its internal temperature will be to the outside ambient. A real wind-tunnel PC won't exhaust air that's more than a few degrees hotter than it was when it went into the case, and most tweaky machines can keep the internal air temperature less than 10 degrees hotter than ambient.'

O It is greater than God and more evil than the devil. The poor have it, the rich need it and if you eat it you'll die. What is it?

What kind of drive you'll need to write these discs is in question at the moment. Pioneer has apparently demonstrated dual layer writing using a plain A06 drive with nothing but a firmware update to make it dual layer capable, but nobody's too hopeful about this turning out to be the norm.

Dual layer discs should be *readable* in everything that can read regular DVD-Rs and DVD+Rs, but it's wise to assume that you *will* need a new drive to write them.

Given that single-layer DVD writers aren't a huge investment now, though, it's not completely daft to buy one anyway. They do DVDs, they do CDs, and you can use them to back up even dual layer discs, if you're willing to accept some quality loss. A transcoding utility like DVD Shrink (www.dvdshrink.org) will do the job.

Top secret files

I I downloaded a nifty tool that tracks HDD usage, and while browsing to see where my disk space had gone, I noticed a very peculiar thing. In my Windows 2000 'WINNT' folder, the program said that there was a folder called CSC which was using 2GB of space. Explorer on the other hand said that there was no such folder, although I have 'show hidden files and folders' checked.

I entered the address manually (C:\WINNT\CSC), and the folder showed up. There are lots of weird files in here with no extensions. Can you tell me what this folder does, and why it's so hidden?
Ognen Plavevski

O That's the Client Side Cache folder, created when you tell Windows to make network files available offline. It can indeed be quite enormous, if you've got a bunch of stuff cached in there.

It should have both the Hidden and System flags set, but it shouldn't be super-ultra-hyper-hidden as you describe. Are you sure Windows hadn't decided that you didn't want to see hidden files in that directory?

Hot hot hot

I In a past *Atomic*, I saw a review of a HSF that was tested at an ambient of 19°C. My current ambient is 29°C. This is Australia. This is summer.

In mid 2001, *Atomic* did a review of 10 Athlon motherboards. Regrettably, I chose the ASUS A7A266, one of four with no fan on the Northbridge chip. The heat from the CPU cooler blew over it as well.

After about three months of running the Great Internet Mersenne Prime Search, either the CPU or the Northbridge expired. The 1.4GHz Athlon didn't have a built-in temperature diode, and the motherboard guessed it was running at 55 to 65°C.

I ordered an EPOX 8KHA and Athlon XP1600+. This motherboard reports a max CPU temp of 45°C, and worked fine for 20 months of its two-year warranty. Then COM1 went bad, then one USB port, then COM2. Must be the Southbridge that's going flaky (no cooler on it); the case has a total of four ventilation fans (two inlet/HD, one exhaust, one PSU).

What is the point of your testing hardware under conditions that only apply in Tasmania and the South Island of New Zealand?
John F

ABOVE: Meet Chernobyl, our highly-scientific and super-accurate CPU heatsink testing rig. It mates to both Athlon and Pentium heatsinks using custom 'plates', and using a thermal probe, we can quickly compare products.

O The ambient temperature for cooler tests doesn't matter, as long as you know what it is. Air and CPU temperatures change by exactly the same amount for a given thermal load. A cooler that keeps a given load down to 50°C (say) when the input air temperature is 20°C will score 70°C if the input air is 40°C.

I'm saying 'input air temperature' rather than 'ambient temperature', because the air inside the case of a running computer won't stay at ambient temperature for long after you turn the PC on. The better ventilated the PC is, and the less heat its components emit, the closer its internal temperature will be to the outside ambient. A real wind-tunnel PC won't exhaust air that's more than a few degrees hotter than it was when it went into the case, and most tweaky machines can keep the internal air temperature less than 10 degrees hotter than ambient, without making too much fan racket.

Atomic's Chernobyl test rig, like the far uglier one I use for my Dan's Data CPU cooler tests, just sits there in the open air. There's nothing wrong with this, as long as you make sure you correct for ambient temperature.

You could sit the Chernobyl rig outdoors at Mawson Base in July and still make perfectly good test numbers.

When an 80 watt simulated P4 load only gives a heater temperature rise of 16°C above ambient on the Chernobyl rig (the results for the 3D Cooler Pro), you're looking at a seriously good air cooler. Such a cooler will definitely deal with the heat output of quite ferociously overclocked CPUs, even if the case it's in has questionable ventilation and the ambient temperature's well into the computing-in-your-underpants range.

To simulate the conditions your computer has been running under, we wouldn't just have to test hardware at high temperatures; we'd have to do it for months on end. We'd also need to test several units, to get a reasonable idea of the real probability of failure at different times.

In other words, you'd like us to set up a full MTBF reference lab. This could mean another couple of zeroes on the cover price of the magazine, and it wouldn't allow for lots of other variables – possible static damage when you worked on the computer, mains power irregularities, etc.

PCs in hot climates *are* more likely to die early, though the difference isn't generally large unless the ambient temperature's *really* high. You seem to have had an unusually bad run. DR

Windows can be a 'tard sometimes. Simon Peppercorn pokes it and prods it into submission. Let's make Windows work it for *us* for once!

Ha! Nothing is 'undeleteable'

Submitted by 'MrKent'

Ever had a file that you can't delete, no matter how much colourful language or creatively crude gestures you give it?

Open a Command window, leave it open but close all other open programs. Ctrl+Alt+Del or Start | Run and type TASKMGR.EXE. In the Processes tab, end the Explorer.exe process. Now, leaving Task Manager open, return to the Command Prompt window and cd\ to the directory the belligerent file is located in. Type DEL <filename> where <filename> is the file you want gone. Go back to the Task Manager, then File | New Task and type EXPLORER.EXE to kickstart the GUI. Close Task Manager. Hope it helps.

Defrag is just a click or two away

When fooling with the registry, we can run the Regedit utility, drill down through the various keys and manually edit or create the dwords or values to perform whatever Windows Wizardry your tweaking little minds desire. Or, you can get a little cleverer about it, and create registry import files of your favourite tweaks. That way, you can store them for later use should an OS reinstall be necessary.

All that is needed for a registry import file is Windows Notepad. So if, for example, you want to create an import file for Windows XP, which will allow you to add the defrag utility to the right click context menu, then open notepad and enter the following:

```
; context_defrag.INF
; Add Defrag to the right click menu
[version]
signature="$CHICAGO$"
[DefaultInstall]
AddReg=AddMe
[AddMe]
HKCR,"Drive\Shell\Defrag\command",,,"DEFRAG.EXE %1"
```

Save the file to wherever you like, such as the Desktop. Name it context_defrag.inf. Make sure that the TXT extension isn't appended to the filename by selecting All Files in the Save As Type pull-down menu.

Right click on the new file and click Install. Assuming that Paris Hilton is a natural blonde, a new entry will be created in your registry, adding the command line version of Defrag to your right click menu.

Do bear in mind that you can only defrag a hard drive, so the option won't appear if you right click on anything else.

Oh, and for those who haven't used this version of defrag, all you will see is a command Window open, which will close once defrag has done its sweet thang.

Wanna wring a few more FPS out of UT2003?

By default, Direct3D is used for rendering. OpenGL can be faster, however, and the visual differences can be minimal.

It's worth checking out whether you would prefer to play under OpenGL. Depending on your exact system/video configuration, it may or may not be a good thing.

To do this, browse to your UT2003/System/folder, wherever that may be. Find the lines that look like:

```
RenderDevice=D3DDrv.D3DRenderDevice
;RenderDevice=Engine.NullRenderDevice
;RenderDevice=OpenGLDrv.OpenGLRenderDevice
```

The first line is active, the other two are being ignored, as indicated by the ';' symbol.

So let's reorganise this a little and make it look like:

```
RenderDevice=OpenGLDrv.OpenGLRenderDevice
;RenderDevice=Engine.NullRenderDevice
;RenderDevice=D3DDrv.D3DRenderDevice
```

Whether or not you choose to opt for OpenGL, or if that little change you decided on made your game look like crap, you can also boost your FPS by removing the 90 FPS cap.

Still within the UT2003.ini, find:

```
[Engine.LevelInfo]
PhysicsDetailLevel=PDL_High
bLowSoundDetail=False
DecalStayScale=2.000000
bNeverPrecache=False
bCapFramerate=True
bShouldPreload=False
```

and change the bCapFramerate value to 'false'.

Yes, it's that easy.

Unlocking WinXP's setupp.ini *(For informational purposes only)*

Submitted by 'Troppo'

There are different versions of the Windows XP CD-ROM, and each behaves a little differently. For example, an OEM CD will only allow a clean install, whereas a retail version allows both a clean install or an upgrade from a previous version.

The setupp.ini file is what controls this. You can take a peek if you look in the i386 directory on the CD-ROM. You will probably find something like:

```
ExtraData=707A667567736F696F697911AE7E05
Pid=55034000
```

The first five numbers in the Pid value define whether the CD is retail or OEM. The last three digits dictate the type of CD key it will accept. If you were to play around with these values you could 'theoretically' have a Window XP CD that behaved like a full retail product, although an OEM key could be used to install it.

For example, a retail CD may have a Pid value of: 55274000, a volume licence may be 51883270 and OEM CDs could have 82503OEM.

TWEAK UP YOUR FELLOW ATOMICAN:

windowstweaks@atomicmpc.com.au

Peter Sbarski brings us the hottest Linux tips. This month: Eric!

Eric Raymond, in his book *The Art of Unix Programming*, wrote that Unix (and by extension Linux) 'has flexibility in depth' and that it is 'fun to hack'. Eric was completely right on both accounts. Unix and Linux in many ways are very adaptable, clean and robust operating systems. Linux is great to work with and it allows us to go deep into the system and tweak virtually anything.

Aliases and functions

When you began learning Linux you came across functions and aliases. To refresh your memory, they allow you to create an alternative pseudonym (command) for one or more pre-existing commands. So for example: *alias wa="ls -A | wc -l"* will create a new shorthand (wa) for displaying the number of directories and files in the current directory. You can also nest aliases, eg. alias waa="ls -A; echo 'total number of files and directories '; wa".

Functions are similar to aliases but they are also more powerful. For instance, it's much better to use a function if you are going to do parameter substitution. When writing a function you can separate statements via a semicolon (like in an alias): *function linfo() { uname -s; uname -r; }*. Alternatively you can place each statement on a new line without any.

Here is an alias and some functions you may find useful. You can type these into a text file (eg: myfunctions) and then run source myfunctions to load them into memory. Or you can place them into a .bashrc file or enter them manually.

- This alias will display the 20 largest directories and files in the current directory. It will also display the overall size of the directory.

alias dsize="du -ack | sort -nr | head -n 20"

- This function does two things. It computes md5 checksums for all files in the current directory (stores them in a compressed text file) and allows you to verify current files against these prerecorded checksums. This script is useful if you have a directory with files that you aren't going to modify (eg: ISOs, movies, music, etc) and you want to verify that they are not corrupt from time to time.

Usage: md5 create to make a list of all files in the current directory with their checksums.

Usage: md5 verify to use the checksum list against the files in the current directory.

Usage: md5 clean to delete the checksum list.

```
<code>
function md5()
{
  temp_file=md5list.$$
  tar_file=.md5list.tar
  gzip_file=$tar_file.gz

  if [[ ! -z $1 && $1 == “create” ]]; then
  md5sum * > $temp_file
  tar -cf $tar_file $temp_file
  gzip -f -9 $tar_file
         rm -f $temp_file
  elif [[ ! -z $1 && $1 == “verify” ]]; then
  if [ ! -e $gzip_file ]; then
 echo “Please run: md5 create”
                   else
                   tar xvzf $gzip_file
                   md5sum —check $temp_file
                   rm -f $temp_file
         fi
  elif [[ ! -z $1 && $1 == “clean” ]]; then
         rm -f $gzip_file
  else
  echo “Please run: md5 create OR md5 verify OR md5 clean”
         fi
}
</code>
```

- This function can be used to simplify the decompression of files. All you need to do is type unpack and the name of a compressed file. At the moment this function understands gzip, bzip, tar, zip and Z. You can add other formats quite easily.

```
<code>
function unpack()
{
       if [[ -z $1 ]]; then
                echo “Please specify a file: unpack file.tar.gz”
       else
                if [ ! -z $(ls $1 | grep $”.tar.gz”) ]; then
                          tar xvzf $1
                elif [ ! -z $(ls $1 | grep $”.tar.bz2”) ]; then
                          tar xvjf $1
                elif [ ! -z $(ls $1 | grep $”.gz”) ]; then
                          gzip -d $1
                elif [ ! -z $(ls $1 | grep $”.bz2”) ]; then
                          bzip2 -d $1
                elif [ ! -z $(ls $1 | grep $”.tar”) ]; then
                          tar -xvf $1
                elif [ ! -z $(ls $1 | grep $”.zip”) ]; then
                          unzip $1
                elif [ ! -z $(ls $1 | grep $”.Z”) ]; then
                          uncompress $1
                fi
       fi
}
```

TWEAK US HAPPY, YEAH!

linuxtweaks@atomicmpc.com.au

The Couch Potato Project part 2

Master Modder Ron Prouse handholds us through the meat in his most glorious sandwich. Tools out, kids!

Part 1 of the Couch Potato Project, which appeared last month (*Atomic* 39), was to modify a desktop case to accept the major components of a water-cooling system, as well as adding a window and external lighting. This tutorial will now shift focus to 'inside', looking at some of the options when it comes to plumbing and wiring.

While it is totally acceptable (desirable?) for a high-performance gaming PC to make its presence known aurally, the rules change when it comes to a home theatre PC (HTPC) environment, where the creed suddenly shifts to 'silence is golden'.

To keep things as quiet as possible, the main heat sources (CPU, GPU and Northbridge) will be liquid cooled, with fans only on the radiator and power supply unit.

The water-cooling components chosen for this project are marketed towards the performance cooling enthusiast – which is overkill in this machine, as it will not be regularly overclocked – however the concept is to under-stress the cooling system as much as possible. The one deviation from performance is the Silverprop Micro radiator (from part 1 of this tutorial), which was chosen purely for its compact external dimensions. If there had been more room, the 'Extreme' model would have been the obvious choice.

The main factors to consider with a water-cooling layout are twofold; first the 'airflow sequence', and second the ease of accessibility of the PC components once everything is in place.

The former is relatively simple once you have chosen which side of the debate you are going to stand on. Which debate? Whether the radiator should be fed with fresh air that then flows into the case, or whether 'warm case air' should be used to cool the radiator.

The second issue, accessibility, may not seem to be significant initially, but, when you consider a poorly designed system can mean that what was 'simple maintenance' now involves draining the entire cooling system, it is fairly easy to understand the importance of forward planning.

As well as functionality, this tutorial also focuses on the aesthetic angle – after all, the HTPC is going to reside among the sleek hi-fi goodies in the entertainment unit, so it has to stand out from the crowd!

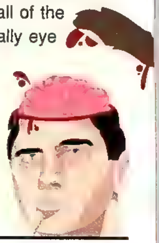
The obvious starting point is to keep everything as simple as it can be – such as hiding as much of the cable clutter as possible, and making sure any wiring that does show looks neat and professional.

If you have been 'modding along' with Part 1 then Part 2 will take you on the next step of the journey – if not, there might be some ideas that you can use on your own case or water-cooling project.

Either way, let's continue the Couch Potato Project. . .

DISCLAIMER

Power-tools, sharp objects, electricity and aerosol paints can be dangerous to your current state of wellbeing, so take care and follow all of the relevant safety precautions. Especially eye protection. This project may also contain a potential hidden danger, fiscal degradation, so observe 'wallet safety' at all times.
Safety is your responsibility, not AJB Publishing's.



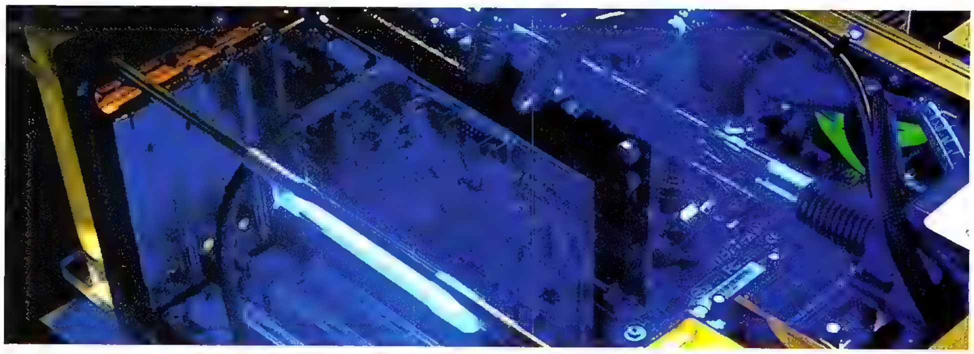
Here's what we used. These parts are commonly available, with the exception of certain components, as listed, which we were only able to source from Silverprop.
Please note all prices are approximations.

- Eheim 12/16mm tubing – $7.00/metre
- Eheim 90 degree bends – $6.95
- 6/11mm black cable sleeving – $3.30/metre
- Panaflow 80mm Medium Speed fan, 32.1 CFM air flow 28.0 dBA - $19.95
- Arctic Silver 5 Thermal Paste – $11.00
- AMD Athlon XP2600+ Barton CPU – $165.00
- PowerColor Radeon All In Wonder 9600Pro Video card – $390.50

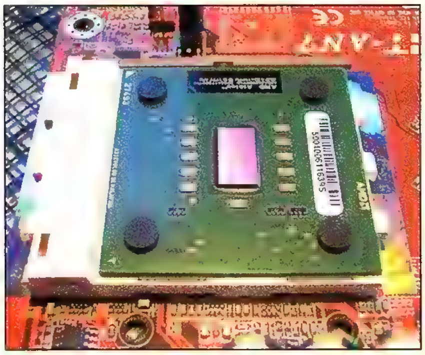
Silverprop: www.silverprop.com, Ph: (03) 9820 0908

- Brass top Cyclone Evolution SE CPU waterblock – $119.00
- Brass top Cyclone Fusion SL GPU waterblock – $79.50
- Brass top Cyclone Nexus SX Chipset waterblock – $79.00

Tools'n'stuff - Jigsaw, Dremel, finishing belt, drill & bits, sandpaper, 13/18mm acrylic tubing, flat acrylic off cuts, CD-ROM case, screw terminals, 200mm X 7/16in spring, 13mm aluminium tubing, 3mm tap.



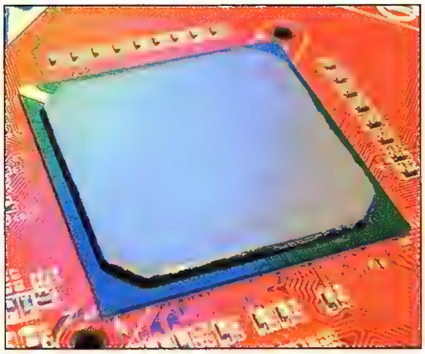
BELOW: Terrifyingly beautiful.



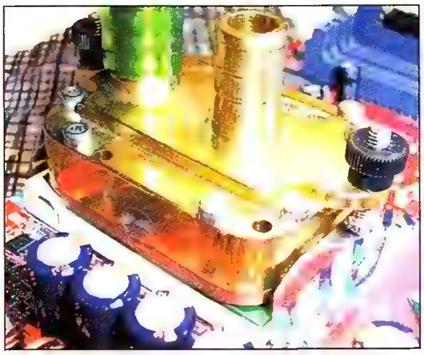
01 Starting with the basics, make sure that the CPU is clean and seated correctly. The decision was made to use an AMD 2600+ Barton, as it is a good price / performance compromise. Apart from gaming use, an HTPC does not really need a cutting-edge CPU.

02 Preparing the Northbridge HSF for water-cooling is straightforward – unplug the fan, use a pair of pliers to remove the plastic locating pins and gently pull the HSF toward you. Clean off all of the OEM thermal paste thoroughly with a clean cloth.

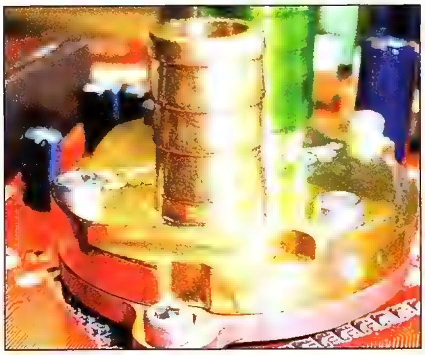
03 Follow the same steps with the graphics card, and then wipe off any remaining thermal paste residue on all three chips with isopropyl alcohol swabs – available at your local chemist. Be sure to remove any dust or lint before the next step.



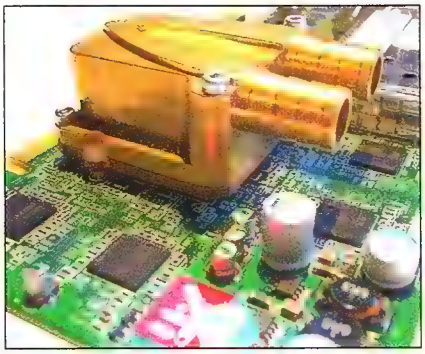
04 Use a very thin layer – almost see through – of good quality thermal paste to provide a long-lasting thermal hook-up. Too much paste will actually degrade cooling performance. In this instance 'Arctic Silver 5' is the weapon of choice.



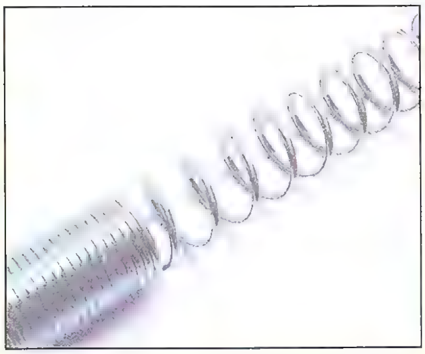
05 When fitting the CPU waterblock make sure that it has the correct orientation and that it is sitting evenly on the chip. The Silverprop 'Cyclone' uses a variation on the OEM HSF retention clip that requires it to be just over finger-tight.



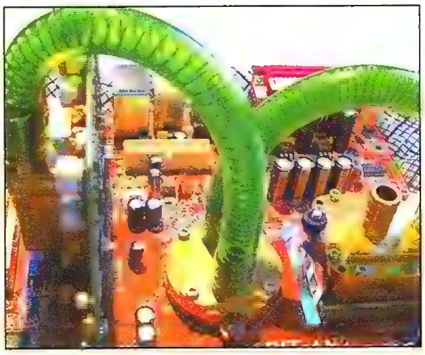
06 The 'Nexus' nForce2 Northbridge waterblock attaches using screws through the two standard mobo locating points. Make sure that the screws are not over-tightened or you will damage the controller chip – again, just over finger-tight is sufficient.



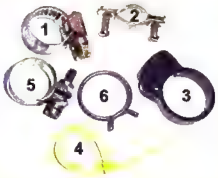
07 The GPU core is relatively easy to crush if too much pressure is applied, so a good safety measure is using plastic screws. These will strip their threads at a lower 'pressure point' than should cause chip damage… but care should still be taken.



08 Once all of the waterblocks are mounted, the hoses can be cut to the correct size. It is easy to avoid hoses 'collapsing' on bends by using an expansion spring (7/16in diameter) inside the tubing. The spring can be 'stretched' to several times its initial length.



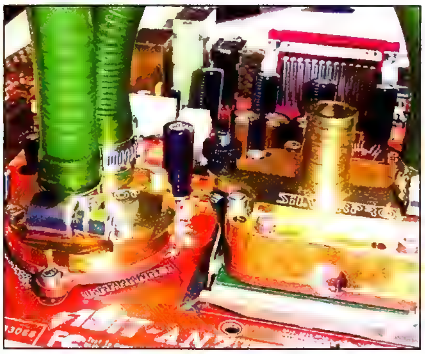
09 With sections of the spring in place it's easy to bend the tubing into shapes not otherwise possible. The inside diameter of this spring is 9.5mm, 0.5mm less than nominal, and will not appreciably reduce flow in a 0.5in system.



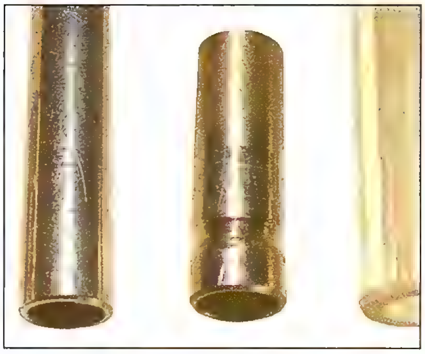
10 **Building liquid-cooled systems** has taught me one thing – the only real threat is the most obvious – coolant leaks. Coolant in contact with 'live' electronic components is usually disastrous, but it's also the easiest thing to avoid. When using purpose-built cooling equipment there is very little incidence of hardware failure as long as the manufacturer's instructions are observed.

The most common source of leaks occurs at the hose joints, and the most common type of clamp used is … none! The rhetoric says silicon tubing grips so well onto hose-barbs that clamps are overkill, however I have seen enough failure to state this is not true. Clamps are a necessity. So, which type of clamp? There are a plethora of styles, the most common are:

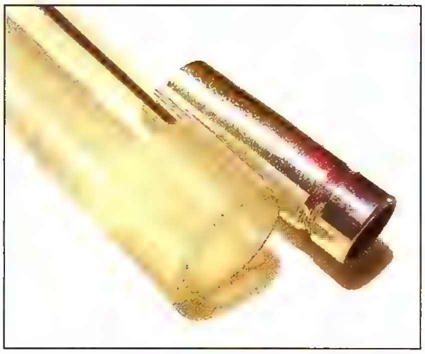
1. Worm drive – look for clamps with a 'rolled edge' that won't cut into soft tubing.
2. Fitted plates – hard to find and usually expensive, they look better than they are; leaks often occur at the 'end gaps' between the plates.
3. Irrigation fittings – made from non-conductive plastic is a great safety advantage, but bulky to use in small spaces.
4. Cable ties – only just better than nothing, will work when used with barbs that have deep grooves.
5. Screw through sleeves – king of clamps! Seamless on inner side and made of malleable aluminium.
6. Spring clips – flat or wire construction, they are also best with deeply grooved barbs. These are the easiest fitting to use in cramped areas, eg: most PC applications!



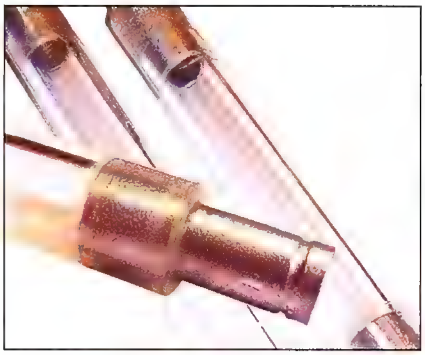
11 When assembling, make sure that any 'twists' are removed from the tubing and that the hose-clamp fittings don't obstruct any of the PC components. Ensure that the tightening screws are still accessible once the mobo is fitted into the case.



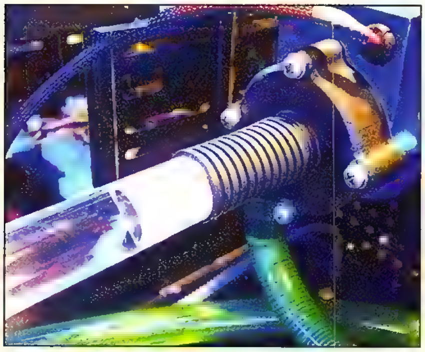
12 A real eye-catching addition is a clear acrylic tube, plumbed to run across the window area. Take two 40mm lengths of 13mm diameter aluminium tube, and grind a deep groove into it 10mm back from one end. Cut a piece of 18/13mm acrylic tubing to the desired length.



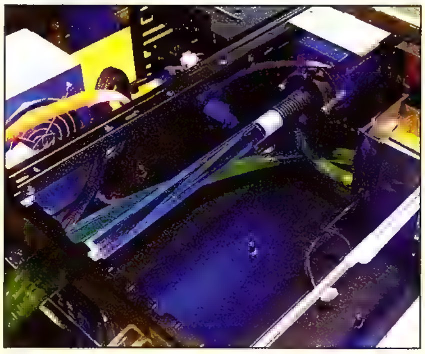
13 Using 1,200-grit sandpaper, rough-up the inside of the acrylic tube, in a circular motion, for the first 20mm. Then wipe over with acetone to give the glue a surface to grip into. Follow the same method on the aluminium tube.



14 Using five-minute epoxy glue (Araldite), assemble the acrylic and aluminium tubes, leaving 20mm of the aluminium exposed as the hose-barb. Once fitted, twist the aluminium through 360 degrees to ensure an even spread of the adhesive. Wipe off any overflow before it sets.



15 Using a short length of hose, connect the aluminium tube into the system – in this case the pump inlet – and clamp the ends. A piece of 20mm split loom can be used to cover up the joint to make it look neater.



16 As well as adding a special effect, the acrylic tube is also functional. A larger diameter supply tube to the pump inlet can help to nullify cavitation that can be caused by a buildup of negative pressure (suction) at this point.

17 If you are looking for some 'specialised' fittings, don't overlook your local aquarium retailer. Eheim produce a line of additional products including solid tubing, 90 degree bends and hose overlays. Another useful source is the irrigation section of hardware stores.

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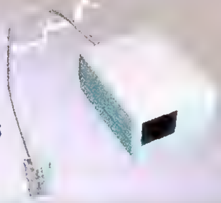

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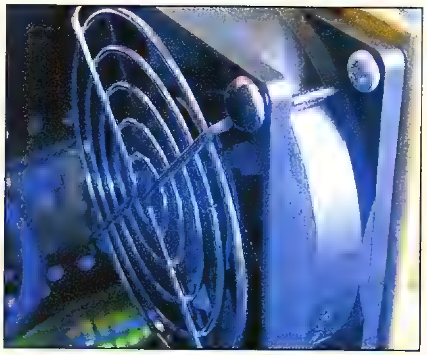
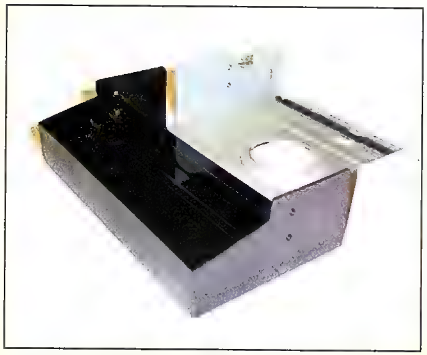
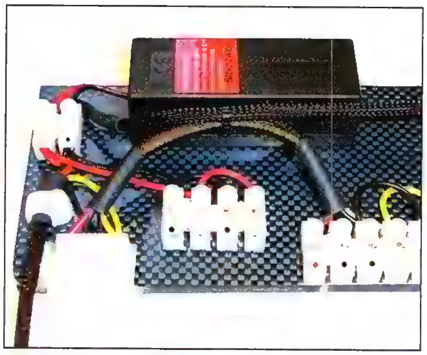
18 The final commissioning of the water-cooling system is a straightforward task. Check all of the clamps, fill with demineralised water and an anti-fungal agent (found at any waterbed shop). Then run the system on its own for 24 hours, and check for leaks.



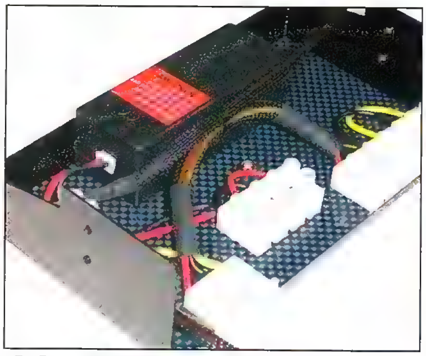
19 Some rough testing at this stage indicated that the airflow through the radiator needed to be increased, so the LED fan was replaced with a Panaflow 80mm Medium Speed fan, which provides 32.1 CFM airflow at only 28.0 dBA.



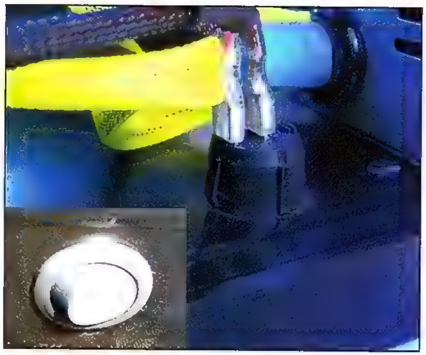
20 With four internal 5.25in drive bays, the easiest place to 'stow' all of the wiring was at the bottom of the rack, in a tray cut out of a gutted CD drive. The tray was shaped so that the OEM screw-holes could still be used.



21 A 6mm acrylic off-cut is used as a baseplate, and a male Molex plug attached with Araldite. The inverter for the external cathodes and three terminal blocks are attached (for the lights, water pump and data drives), and the wires sleeved.

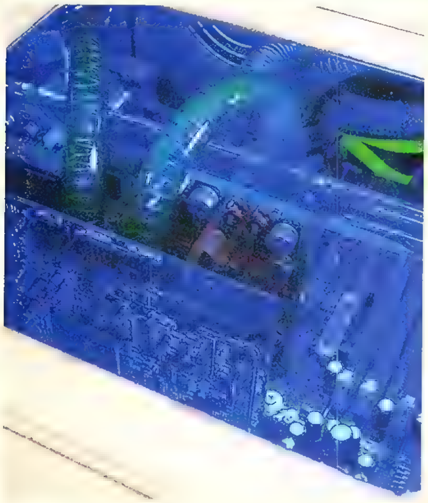


22 The baseplate is attached to the tray with silicon and one 3mm screw drilled and tapped in the centre. The tray was painted gloss black so that it matched the powder-coated finish of the case chassis.



23 All lighting is controlled by a single low-profile switch, concealed under the case for easy access. The wires are a 'make or break' on the 12V positive, and run back to the wiring tray terminal block.

Conclusion



With the case top fitted, the overall effect is beginning to take shape. The acrylic delivery tube is clearly visible through the window, and adds another dimension to the usual 'mess' of plumbing hoses that a '3-point' cooling system normally results in.

One thing worthy of mentioning is the quality of the water-cooling components that are now available. Apart from performing well, the latest offerings also have a style and finish that is worthy of a 'window seat', unlike the square metal boxes of just a short time ago. Retention mechanisms are simple and actually work, the barbs point in the right direction, and pumps are more compact and silent. As testimony to the plug'n'play nature of a more mature and reliable product market, this water-cooling system has been running for over a week without as much as a drop of leakage from any of the six components – it is ready for the memory and PCI cards to be fitted for the final time.

Space inside a desktop case is at a premium – especially if the system is using full-sized components – however with some forward planning it is all fitting neatly together. Just as well, because there are still a heap of components and cables waiting to go in!

The other gratifying thing is that, as more PC components are fitted, it is looking less like a PC! Well, less like a conventional PC anyway. It's probably just because the desktop format is not that familiar to modders raised on tower-systems, but I had to laugh after two 'experienced' onlookers asked me what this case was originally used for!

The final tutorial will look at fitting accent lighting, painting optical drives, adding soundproofing and sleeving remaining wiring – all things transferable to any format of case you might consider modding.

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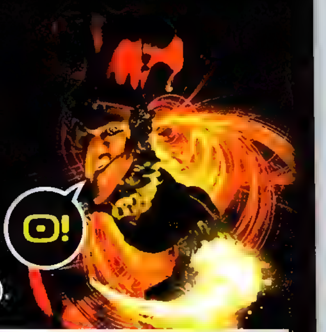

The giving page

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This is one seriously spunky little digicam. Creative has done well, designing a smart-looking and feature rich package. 3.2 megapixels are all the dots you'll need. The 12x zoom is going to get you places no other cam can handle. It's got 16MB on board, but you can shove an SD card in it to expand it to whatever you want. Tidy. We do like seeing Creative continue to expand its range, and it's always pleasing to see Creative do so with flair and quality. Thanks fellas! www.australia.creative.com

Q What is the answer to the riddle on *page 68* that runs along the edge of the page?

2 x 256MB GBA Flash2Advance

Nintendo's GBA is more than just the product that saved the company – it's cool and has loads of moddy potential. CoolPC is stocking a rather nice bit of kit, in the Flash2Advance. It's designed to allow you to make backups of your games on one cart. Like the Xbox HDD, but for GBA. Tres sexy. We were most impressed when Nathan figured out how to use it to store and play movies, complete with a special OS for the job! Magnificent. Thanks to CoolPC for this prizage. www.coolpc.com

Q What is the solution to the riddle on *page 34*?

5 x DVD copies of Far Cry

Could this be the greatest FPS ever? Well we think so, this month at least. With minimal fanfare the demo took the gaming world by storm, and now that we've played the full game through three times each, we're in shock and awe. The FPS bar has been lifted forever with Far Cry. We love it. You'll love it. It loves itself. Ubisoft have kindly thrown five copies of the DVD version at us, for you. It's a sweet, sweet deal. Good one Ubi! Go Far Cry! www.farcry.ubi.com

Q What is the correct response to the riddle on *page 60*?

EMAIL ENTRIES TO WIN@ATOMICMPC.COM.AU OR POST THEM TO: ATOMIC, PO BOX 2286, STRAWBERRY HILLS NSW 2012. PLEASE SEND A SEPARATE ENTRY FOR EACH COMPETITION. PLEASE ENSURE THE COMPETITION NAME IS THE SUBJECT OF THE EMAIL, OR IS DISPLAYED CLEARLY ON THE FRONT OF THE ENVELOPE. THE CLOSING DATE FOR ENTRIES IS 19 MAY 2004. WINNERS WILL BE ANNOUNCED IN *ATOMIC* 42.

Atomic 38 winners: ThermalTake Aquarius 3 CPU water cooling Q. What name did the Romans primarily identify the Greek God of water and sea with? A. Neptune. R. Fesus, Wollongong, NSW. Belkin Nostromo SpeedPad n52 controller Q. What did the Greek god of speed give the son of the union between Zeus and Acrisius' daughter to detach whose head? A. Sickle of Cronus to detach Medusa's head. C. Martin, Eudlo, Qld. Philips Gaming Headphone (HG-100) Q. The Greek god of music was given which musical instrument from whom as compensation for what? A. Apollo was given the lyre by Hermes as compensation for cattle theft. T. Davidson, Glossodia, NSW. Antec P160 full tower case Q. What is the name of the Mountain from which the Greek god whose name rhymes with 'deuce' ruled? A. Zeus ruled from Mount Olympus. J. Zack, Bradbury, NSW.

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Keeping the faith

John Simpson barely survives his journey to the Mac jungle.

There's a scene in the 1986 movie *The Mission* where Guarani natives tie a Jesuit priest to a crucifix and push him over a waterfall. In a spectacular demonstration of faith versus very large rocks, the priest ends up as pious paste, while the natives go back to stringing beads and making running shoes for three cents an hour.

It's a scene I keep playing over and over in my head. It's right up there with Frodo dropping the ring in the volcano, or the *Star Wars* Stormtrooper hitting his head on the door (a prime candidate for Jedi mind tricks, no doubt). I've never really understood how the priests from back then could be so steadfast in their beliefs, even if it meant being battered senseless.

That is, until two weeks ago. In a strange turn of events, I was thrown into a workplace that (shock! horror!) uses nothing but Macs. Yes, yes, I know… right about now, all you Mac evangelists are waving your hands about and blowing virtues out your OSs. But I've gotta say, it's no wonder they call Mac conventions the *other* Special Olympics. No matter what they say, I reckon those computers are just plain peculiar.

There I was, a PC missionary in a jungle of brushed aluminium and clear plastic, surrounded by natives with 16x9-shaped eyes. Right away I knew something was wrong – not a noisy fan bearing to be heard. Just a pervasive silence, punctuated every so often with a soft beep or latte sip. And the gleam from all that plastic! It was like I'd just stumbled on to a fat camp for Tupperware containers.

Being the confident guy I am, I picked out a seat and dropped in front of a G4. A computer is a computer, I figured. If I could configure a redundant RAID array I could surely drive one of these lunchboxes. Right?

'Has someone seen my right mouse button?' was the first thing I said, part genuinely confused and part smart arse. When things had stopped hitting my head (pens, books, hands) someone told me that Mac mice don't have any buttons. At all. Just a big press.

Not content with one foot, I raised the other. 'So how do I open my action menus?'

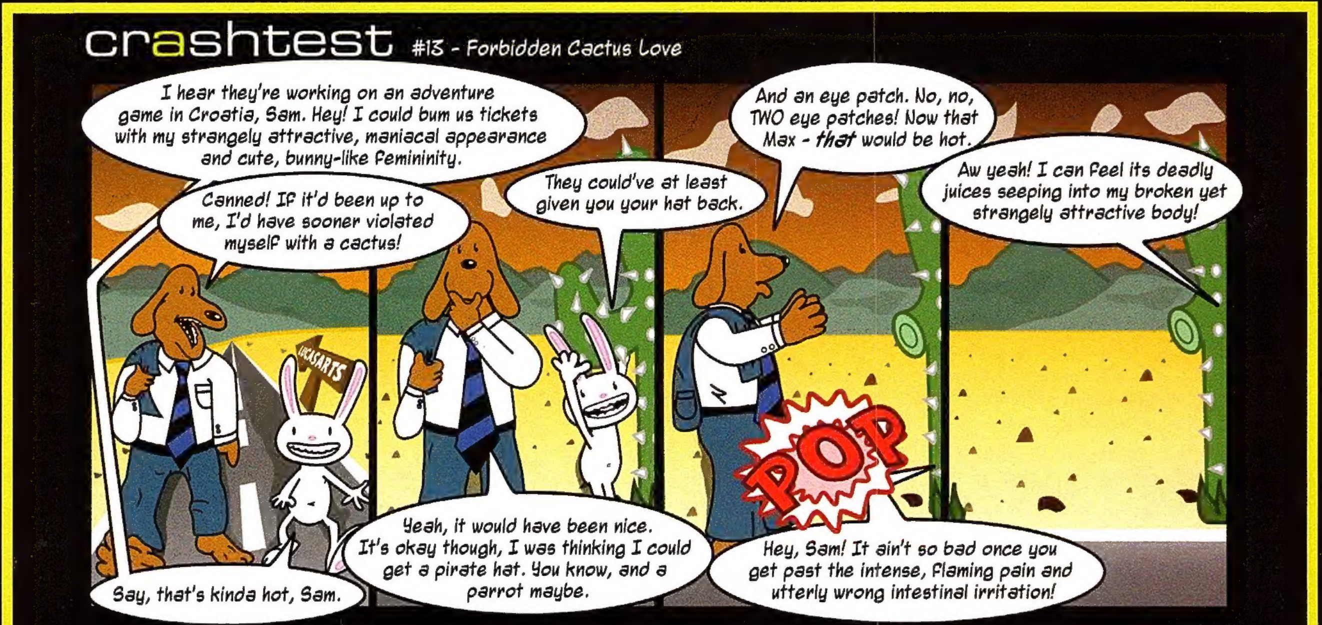
More objects to the head. Then Mac babble (the term I use for the sound of Mac geeks arguing over their favourite photo in MacWorld). Nobody really knew what an action menu was. One guy, deadly serious, said that playing games at work was against company policy.

A bit of investigating revealed that something called the *command key* does just about everything, but only if you use it in the correct combination with any number of other keys. Like some secret Stonecutter handshake, a guy called Edwin gave me a demonstration of how you can design a particle accelerator without even touching the mouse. 'Now to *invert* you hit command then shift, then backspace with the ring finger on your left hand, then control while looking directly at the sun and humming a tune from *Les Miserables*…blah blah' he went on. If this is what it took to get into the club, I was destined to be the pool boy.

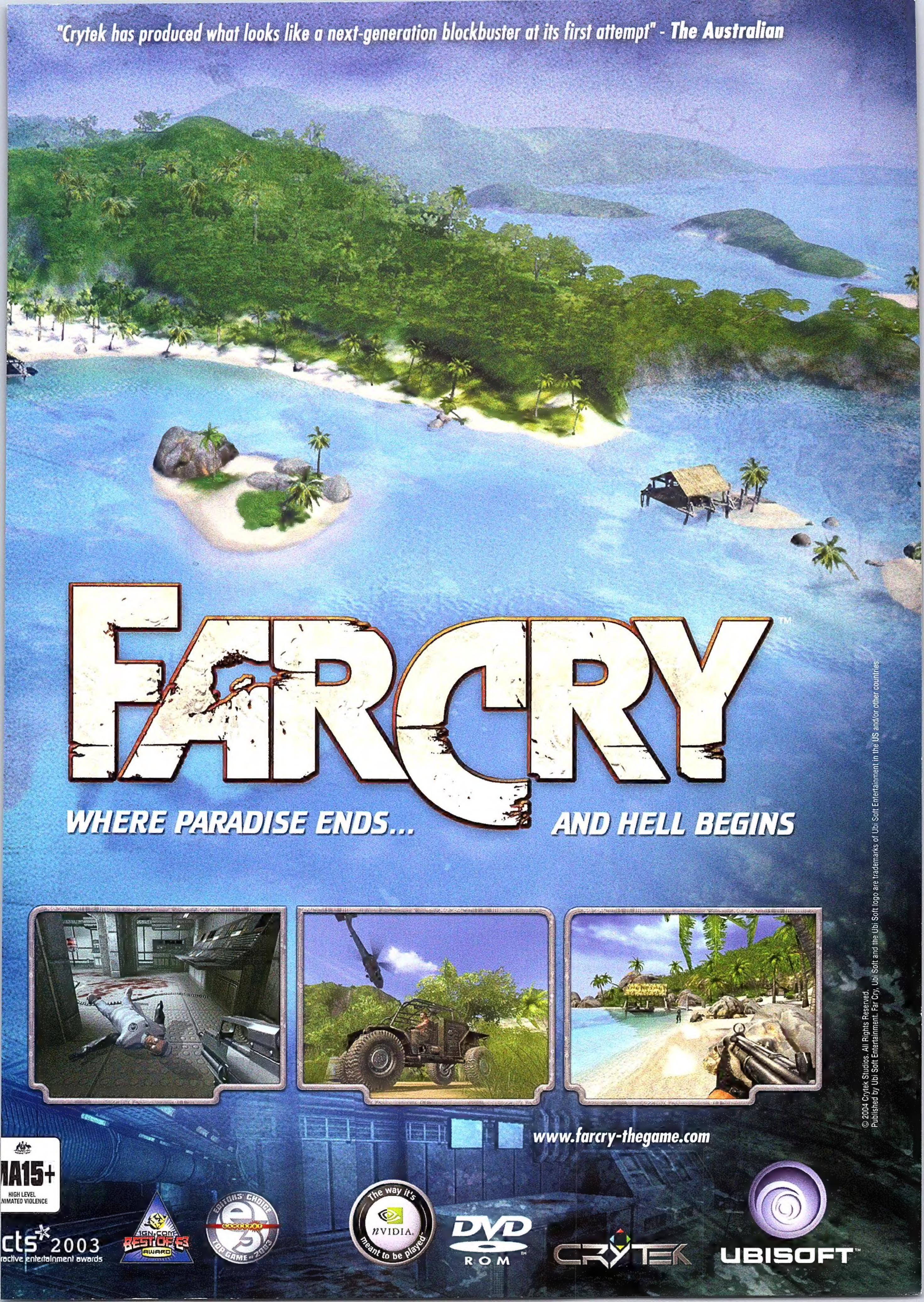
After my first week of juggling hotkeys and upside-down menus I was pretty much jack of it all. I went to the team leader and told him about my issues, and that I'd surely stab someone through the eye if they asked me again what a file extension was. He was quite understanding, offering to do anything to stop me from swearing so much and scaring the cleaning lady. Finally, it was my turn to bring religion to the natives.

'I'd like a PC,' I said, simple as that. The rest of the room must've heard, because the sipping stopped and someone lost their beret. Like the Jesuit priests of old, I could feel my arms slowly being strapped to the wood, and hear the rush of the water as it tumbled over the edge of my contract. Down, down, onto the foamy crash of my next Centrelink application.

Suffice to say I don't work there any more. Do I regret my time in the jungle? Not really. At least now I know where all those recycled shopping bags go. And my understanding of Macs? Let's just say I won't be converting any time soon. But I will miss those lattes.


crashtest #13 - Forbidden Cactus Love
I hear they're working on an adventure game in Croatia, Sam. Hey! I could bum us tickets with my strangely attractive, maniacal appearance and cute, bunny-like femininity.
Canned! If it'd been up to me, I'd have sooner violated myself with a cactus!
LUCASARTS
Say, that's kinda hot, Sam.
They could've at least given you your hat back.
Yeah, it would have been nice. It's okay though, I was thinking I could get a pirate hat. You know, and a parrot maybe.
And an eye patch. No, no, TWO eye patches! Now that Max - that would be hot.
POP
Hey, Sam! It ain't so bad once you get past the intense, flaming pain and utterly wrong intestinal irritation!
Aw yeah! I can feel its deadly juices seeping into my broken yet strangely attractive body!

Written by Logan Booker. Illustrated by Craig Simms. © Copyright 2004 Atomic: Maximum Power Computing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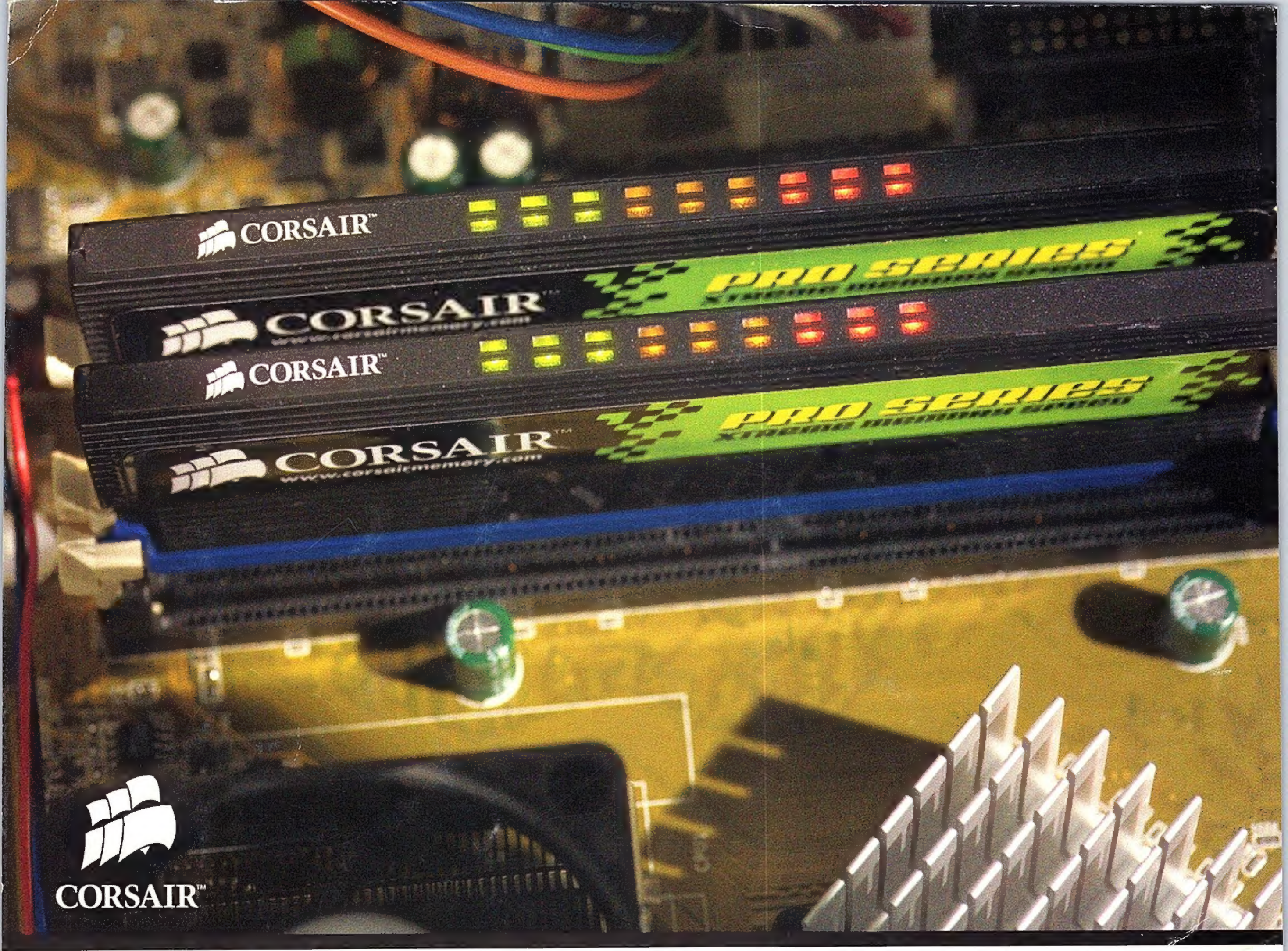

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